16 November 2017

Multi Dimensional Modelling

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Todays Speakers

Teddy Murphy

CEO

Positive, enthusiastic and can make it happen, Teddy has been developing Budgeting and Forecasting models for almost 20 years. In a previous Management Accountant role, he developed his skills with integrated Excel models.

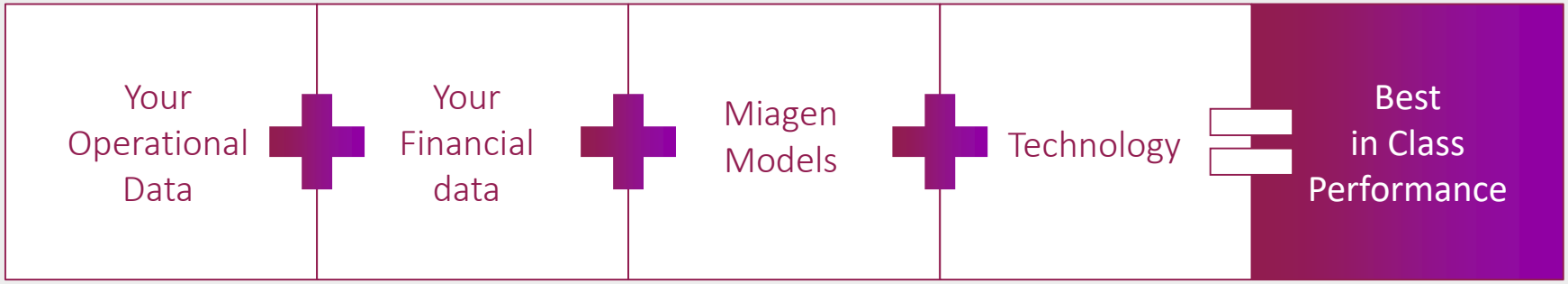
Diarmuid Gahan

COO

Diarmuid was CFO/COO and a founding member of FINEOS Corporation as well as CFO at Version 1. He is a Fellow of the Institute of Chartered Accountants in Ireland.

Advanced CPM Solutions

A proven systems partner enabling superior corporate performance



World-class CPM, World-class FP&A

Faster and better decision making

Faster Response

Everyone manages performance and profit

More opportunities revealed

Miagen by numbers

#1
fastest growing cloud CPM systems practice in EMEA

17+
Countries where our models are used and growing fast

3
Offices; Dublin, London, Abu Dhabi

30%
Annual growth since inception

€100bn+
In revenue planned through Miagen models

90days
For us to deliver an end-to-end enterprise solution

99.7%
Model uptime

24/7
Availability to our clients

1st
Cloud CPM systems practice in the Middle East

<1hr
Average response time to support requests

Best in Class Financial Systems

What is Best in Class Planning?

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Planning Process Development Path

What is Best in Class Planning?

Driver Based

An approach where forecasts are based on key operational drivers, and not on costs and revenue silos

01

Enterprise Integration

A single flexible planning and decision support *system* that is aligned with business strategy and integrates across all the functions of the enterprise

02

Multi-dimensional views

Insight into which services, products, customers, routes etc. are more profitable gives managers the ability to decide what products to sell to which customers and in what markets and at what price

03

Best In Class

Prescriptive Analytics

Provides foresight by answering the question "How can we make it happen?"

06

Visualisation/Optimisation

Use of visualization and optimisation tools to give financial insight and uncover profit opportunities

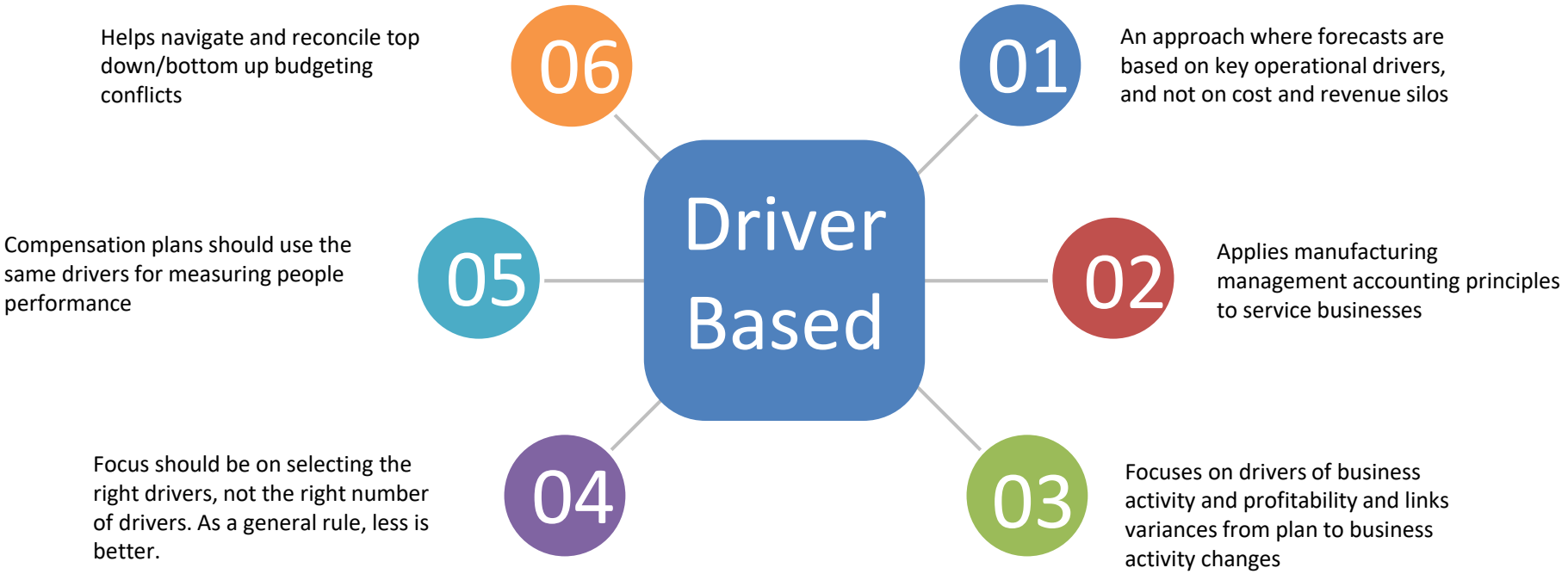
05

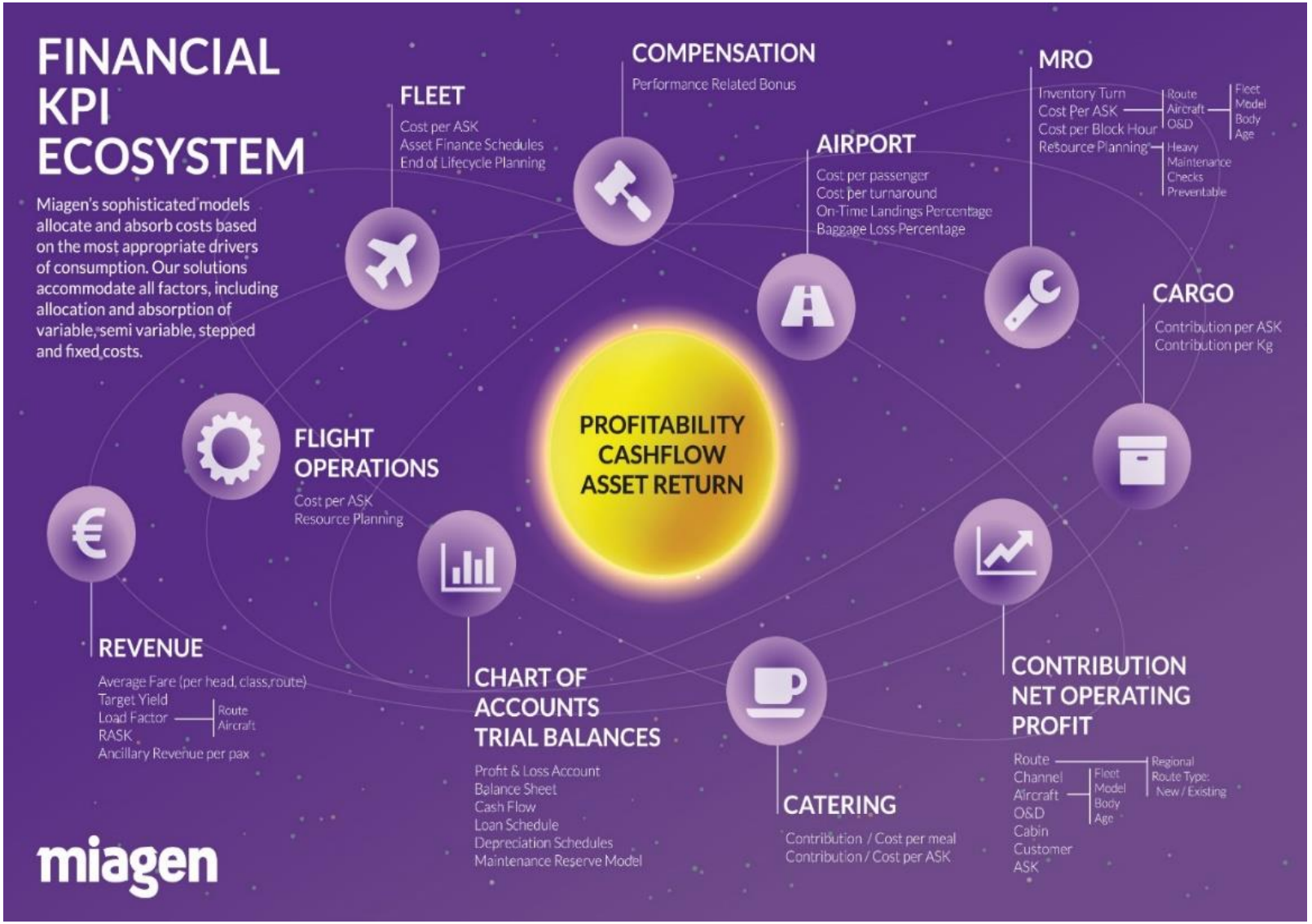
External Data/Benchmarking

Use of reliable external benchmarks or historical internal benchmarks to challenge plans and drive improved performance

04

1. Driver Based Planning




FINANCIAL KPI ECOSYSTEM
Miagen's sophisticated models allocate and absorb costs based on the most appropriate drivers of consumption. Our solutions accommodate all factors, including allocation and absorption of variable, semi variable, stepped and fixed costs.
FLEET
Cost per ASK
Asset Finance Schedules
End of Lifecycle Planning
COMPENSATION
Performance Related Bonus
AIRPORT
Cost per passenger
Cost per turnaround
On-Time Landings Percentage
Baggage Loss Percentage
MRO
Inventory Turn
Cost Per ASK
Cost per Block Hour
Resource Planning
Route
Aircraft
O&D
Fleet
Model
Body
Age
Heavy Maintenance Checks Preventable
CARGO
Contribution per ASK
Contribution per Kg
PROFITABILITY
CASHFLOW
ASSET RETURN
FLIGHT OPERATIONS
Cost per ASK
Resource Planning
REVENUE
Average Fare (per head, class, route)
Target Yield
Load Factor
RASK
Ancillary Revenue per pax
Route
Aircraft
CHART OF ACCOUNTS
TRIAL BALANCES
Profit & Loss Account
Balance Sheet
Cash Flow
Loan Schedule
Depreciation Schedules
Maintenance Reserve Model
CATERING
Contribution / Cost per meal
Contribution / Cost per ASK
CONTRIBUTION
NET OPERATING
PROFIT
Route
Channel
Aircraft
O&D
Cabin
Customer
ASK
Fleet
Model
Body
Age
Regional
Route Type:
New / Existing
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2. Integrated Enterprise Models

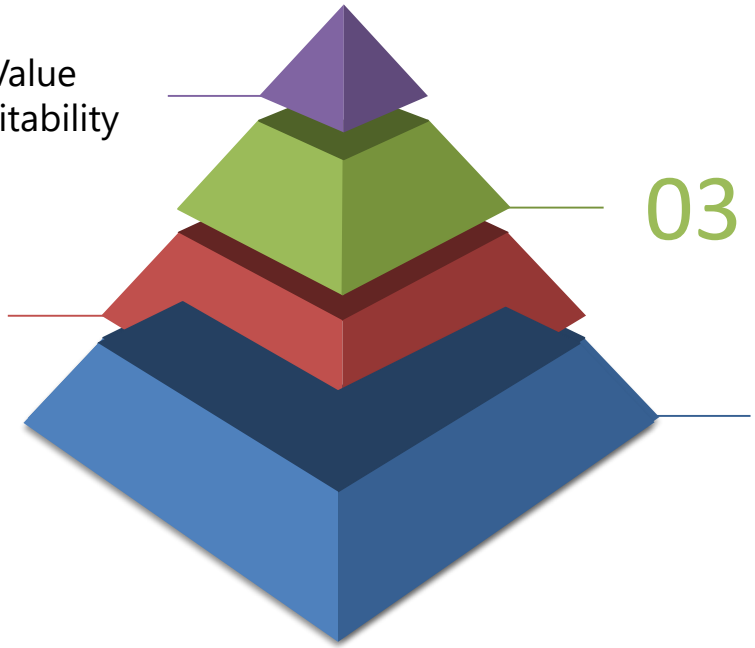
Advantages

- a single flexible planning and decision support *system* that is aligned with business strategy and integrates across all the functions of the enterprise
- proper collaborative planning leading to a single source of planning truth, more business ownership of financial plans and better outcomes against plan
- properly implemented near real time forecasting, scenario planning and budgeting is possible.
- management can act in harmony, with full insight across the enterprise, to make faster and more informed decisions.

Integrated Enterprise Models

3. Multi Dimensional Views of Profitability

Complex Design Leads to a Clear Outcome:
Insight to optimise allocation of resources and maximise profitability



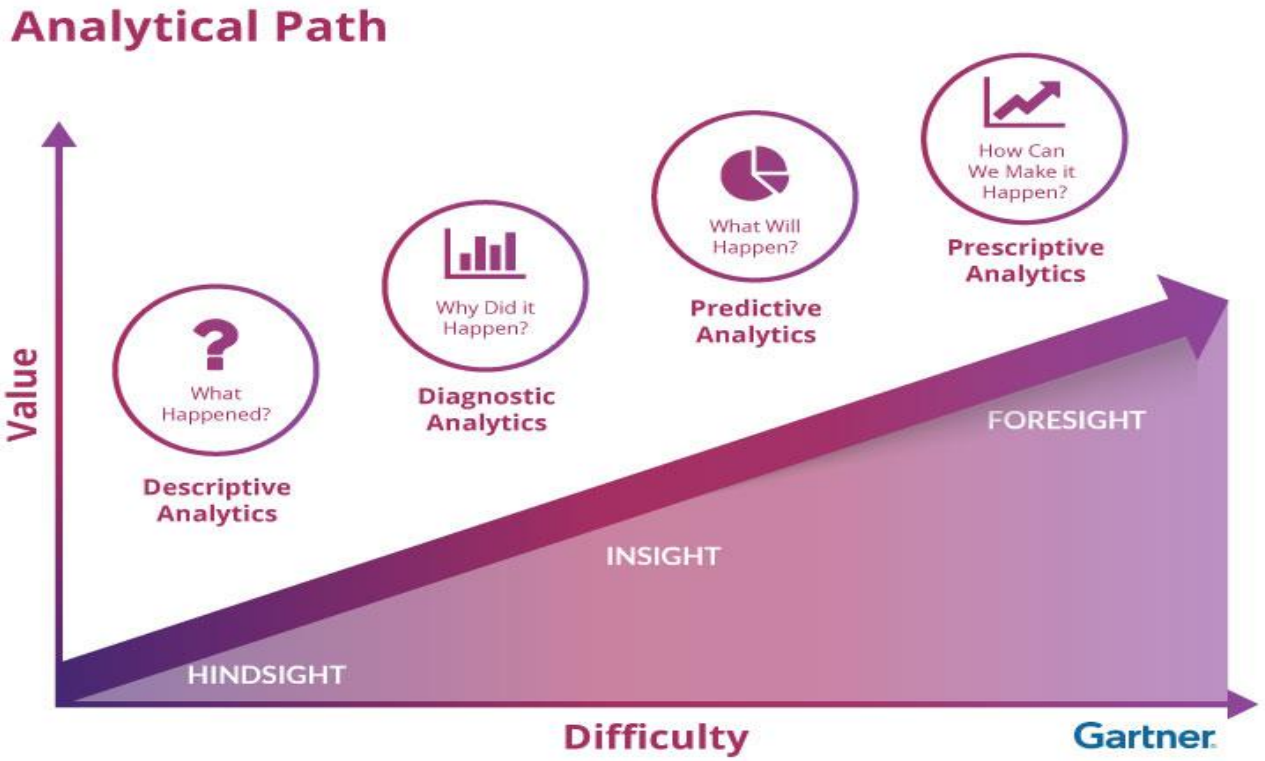
04 Services/Value Chain Profitability

03 Customer/Channel Profitability

02 Profitability by ASK/Aircraft

01 Profitability by Route and O&D

4. Analytics


Analytical Path
Value
What Happened?
Descriptive Analytics
Why Did it Happen?
Diagnostic Analytics
What Will Happen?
Predictive Analytics
How Can We Make it Happen?
Prescriptive Analytics
HINDSIGHT
INSIGHT
FORESIGHT
Difficulty
Gartner

5. Other Features of Best in Class

04 **Visualisation**
insightful personalised self-service dashboards - an essential for the best in class accolade

02 **Benchmarks**
External and internal benchmarks integrated into planning model

03 **Optimisation**
Sales planning, rotables, maintenance, flight scheduling, fare classes, fleet plans, crew pairings

01 **External Data**
Macro economic data, fx and interest rates curves

High Level Benchmarks		
Unit Cost	Unit Revenue	Unit Profit
Unit Cost Growth	Unit Revenue Growth	Unit Profit Growth
Return on Capital	Free Cashflow % of Invested Capital	Operating Margin % of Revenue
Cost Component Trends (Fuel, Labour, MRO, Infrastructure)	Yields	Yields Trends
RPK	Net Profit per RPK	

6. Technology Software

- Modern, agile, designed for modern needs
- Cloud based
- Finance team retain control of project, use IT as support service
- Trained project manager, finance people are not always good project people
- Use established project management methodology
- Ensure the project manager reports directly to a senior member of the finance leadership team
- Select a vendor who understands your business
- Select a vendor team who are technology accountants, not general technologists/business consultants
- Leverage best practice from other industry verticals

“The marriage of finance knowledge and technology expertise marks out the best partners”

Quick Recap of Key Attributes

- Full Enterprise Integration
- Driver Based (Manufacturing Principles)
- Multi-dimensional View of Profitability
- Use of External Data
- Integrated Benchmarking
- Data Visualisation
- Leveraging of Optimisation Engines
- Prescriptive Analytical Skills
- The right technology and the right vendor

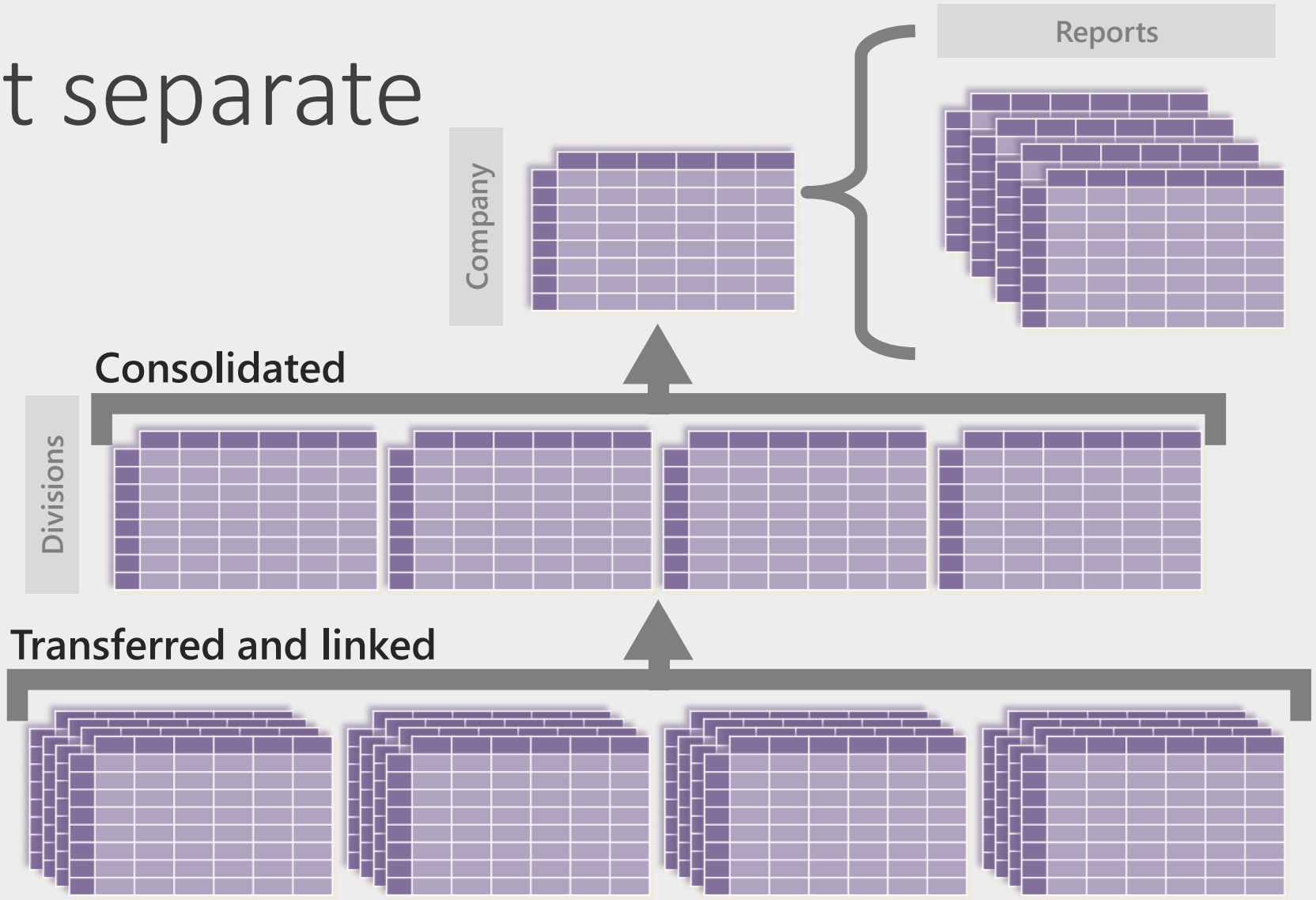
AND

MODERN TECHNOLOGY

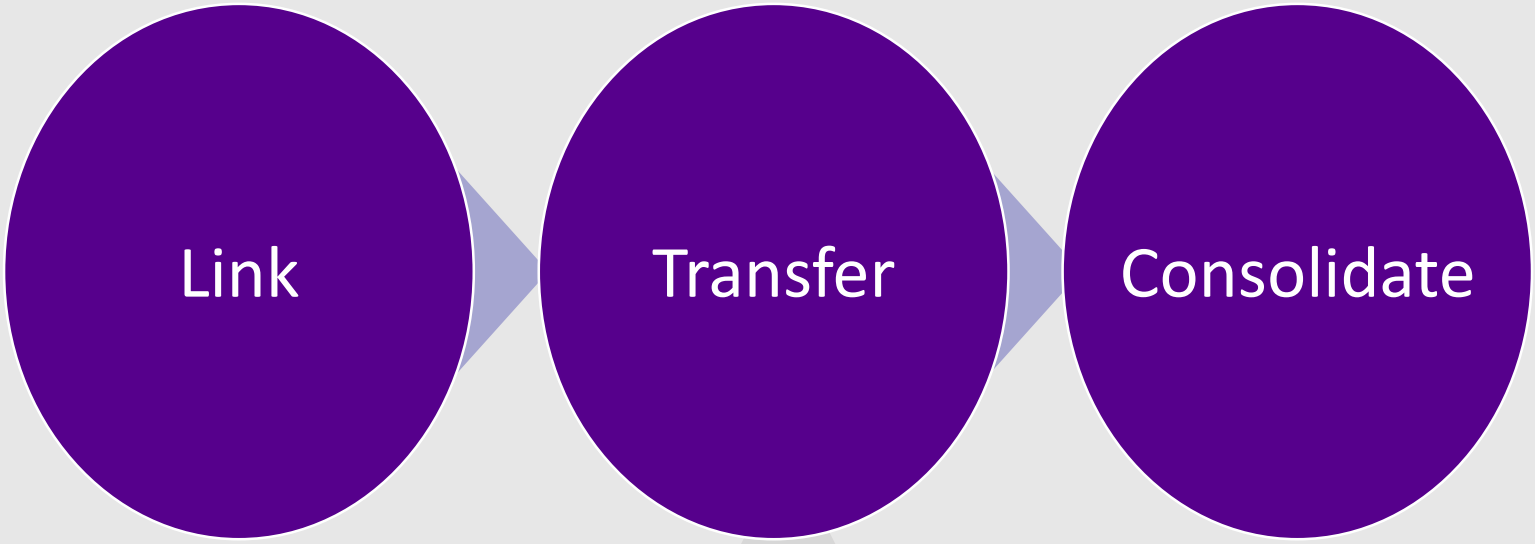
Multi-Dimensional Modelling

Why we need
a model

Structure and Data are not separate



Too Many Steps



Again & Again & Again

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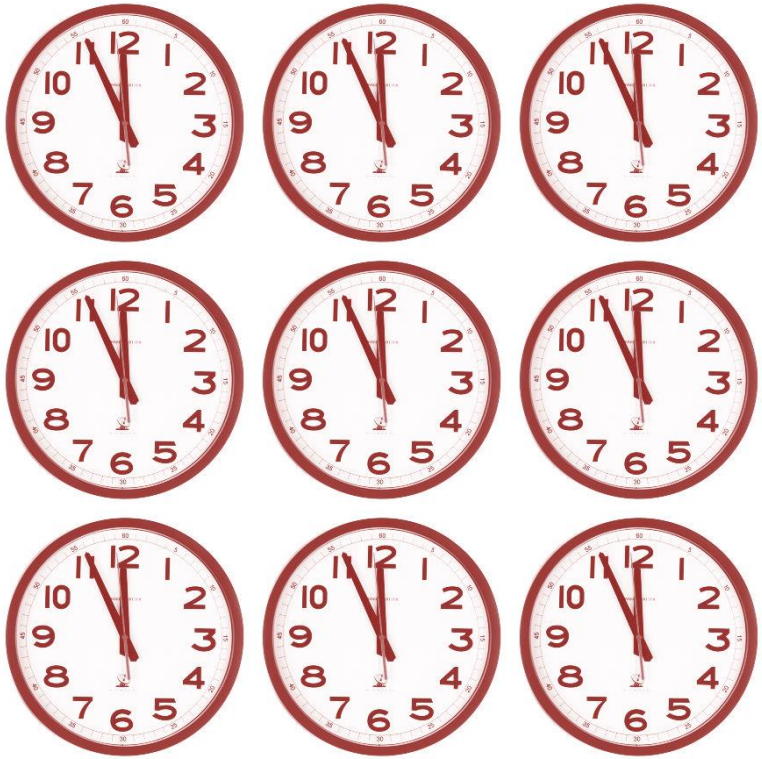
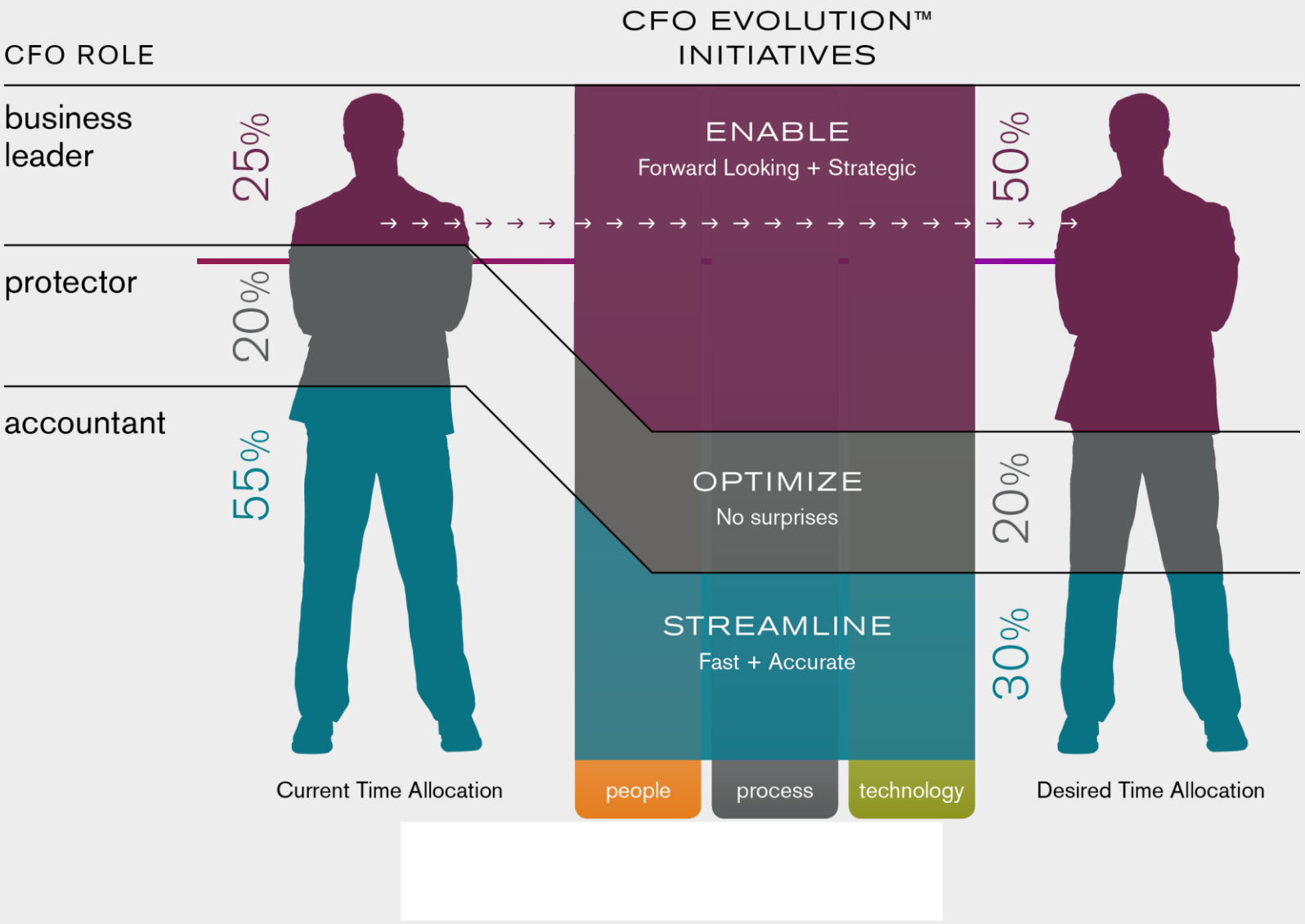
90% Crunch V's 10% Analysis



Crunching data is a Barrier to progression



Databases – Relational V Multi-Dimensional

Relational Databases

1. System of Record, many, many records
2. Query and Cache
3. Report, Export to Excel

Relational Database Table

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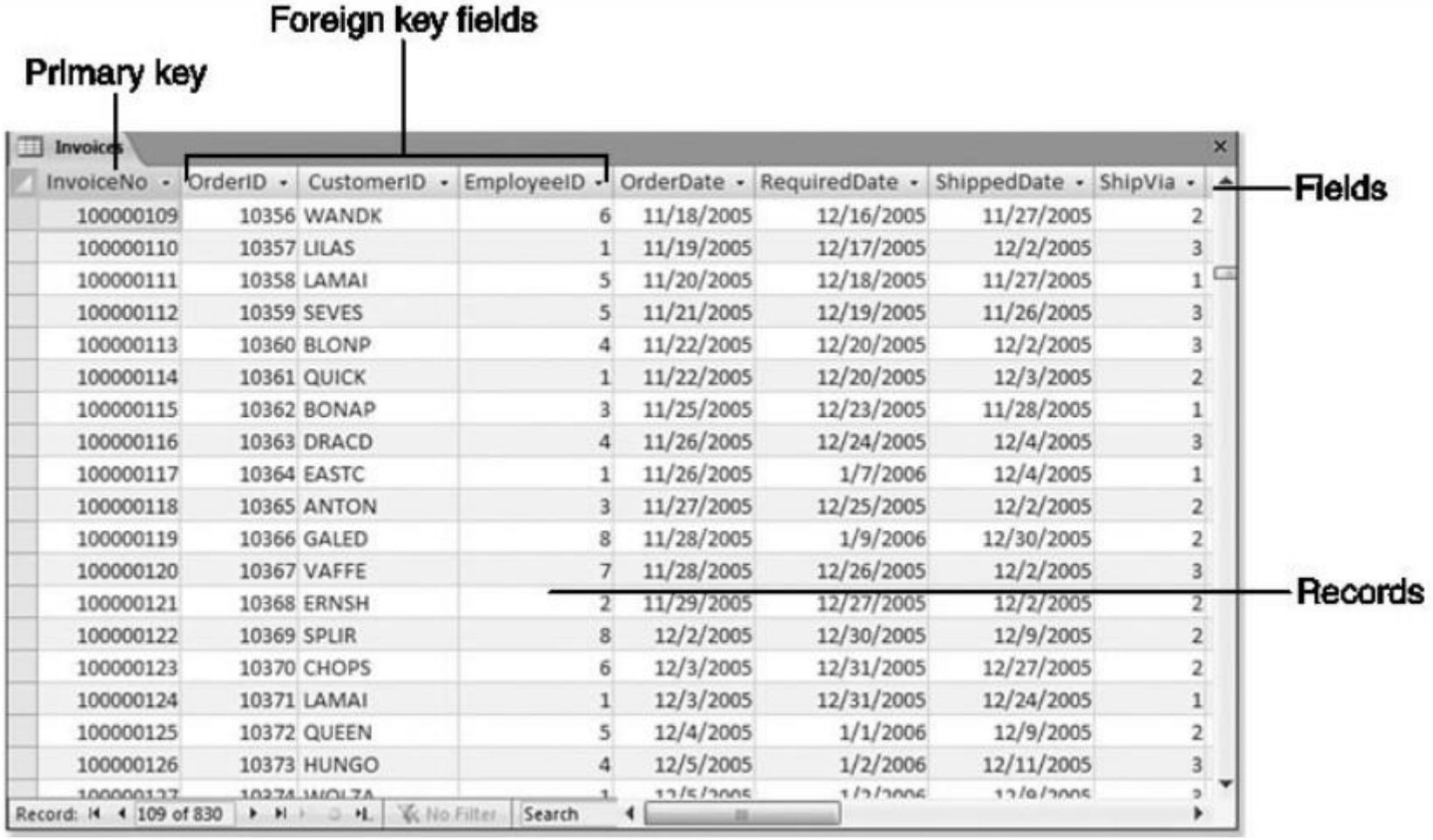

InvoiceNo	OrderID	CustomerID	EmployeeID	OrderDate	RequiredDate	ShippedDate	ShipVia
100000109	10356	WANDK	6	11/18/2005	12/16/2005	11/27/2005	2
100000110	10357	LILAS	1	11/19/2005	12/17/2005	12/2/2005	3
100000111	10358	LAMAI	5	11/20/2005	12/18/2005	11/27/2005	1
100000112	10359	SEVES	5	11/21/2005	12/19/2005	11/26/2005	3
100000113	10360	BLONP	4	11/22/2005	12/20/2005	12/2/2005	3
100000114	10361	QUICK	1	11/22/2005	12/20/2005	12/3/2005	2
100000115	10362	BONAP	3	11/25/2005	12/23/2005	11/28/2005	1
100000116	10363	DRACD	4	11/26/2005	12/24/2005	12/4/2005	3
100000117	10364	EASTC	1	11/26/2005	1/7/2006	12/4/2005	1
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100000126	10373	HUNGO	4	12/5/2005	1/2/2006	12/11/2005	3

Relational Database Schema

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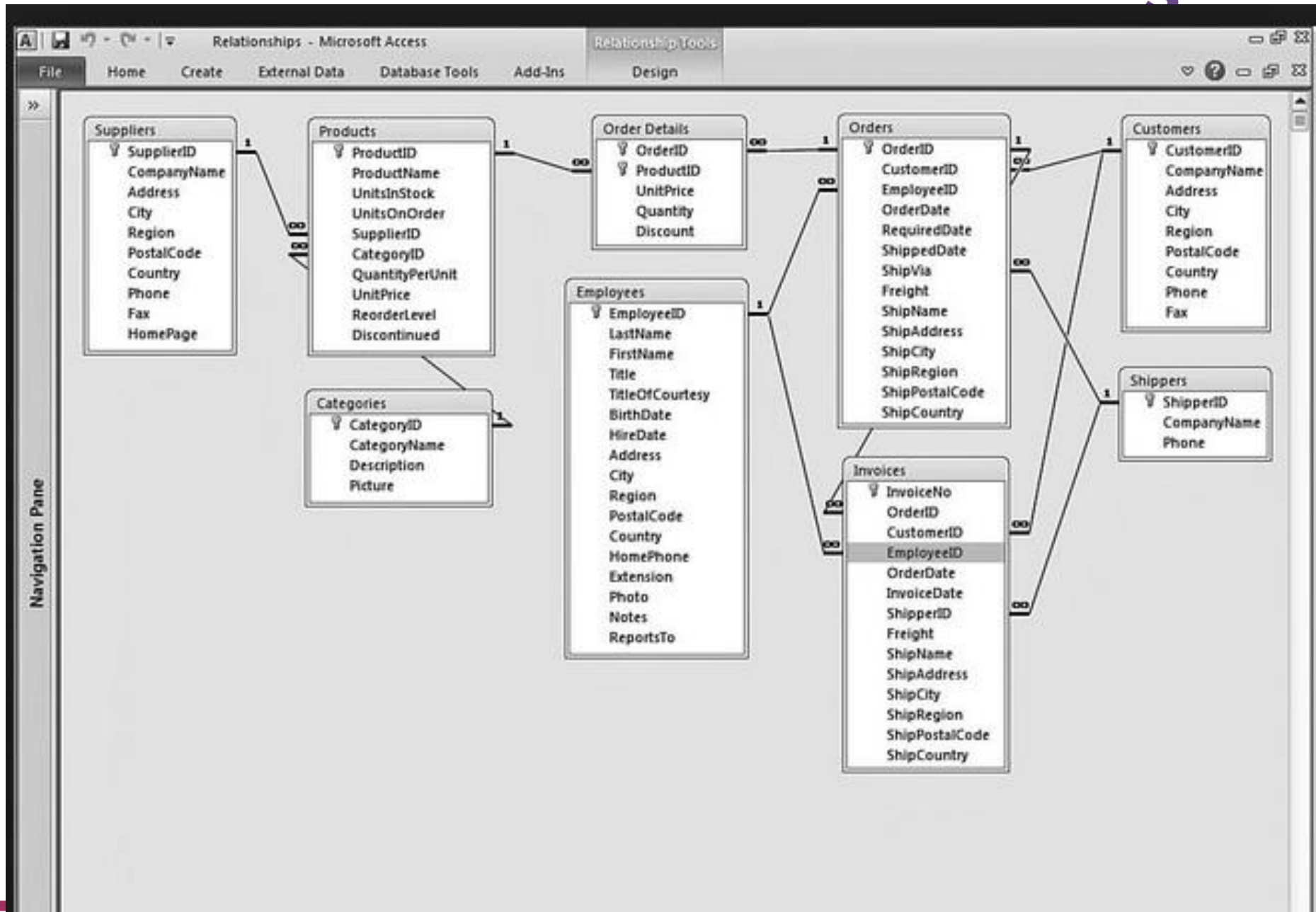

Trial Balance – Relational Extract

ystem: 5/5/2011 7:06:19 AM
ser Date: 4/12/2017

TRIAL BALANCE SUMMARY FOR 2017
Fabrikam, Inc.
General Ledger

Page: 1
User ID: sa

Ranges: From: To:
Date: 1/1/2017 12/31/2017
Account: First yyy-yyyy-yy

Sorted By: Segment1
Include: Posting
Print Currency In: Functional (Z-US$)

Inactive	Account	Description	Beginning Balance	Debit	Credit	Net Change	Ending Balance
	000-1100-00	Cash - Operating Account	$0.00	$276,390.43	$504,213.21	($227,822.78)	($227,822.78)
	000-1110-00	Cash - Payroll	$0.00	$0.00	$307,130.71	($307,130.71)	($307,130.71)
	000-1130-00	Petty Cash	$0.00	$50.00	$50.00	$0.00	$0.00
	000-1200-00	Accounts Receivable	$0.00	$500,091.87	$276,090.43	$224,001.44	$224,001.44
	000-1300-01	Inventory - Retail/Parts	$0.00	$202,389.55	$247,534.93	($45,145.38)	($45,145.38)
	000-1300-02	Inventory - Finished Goods	$0.00	$2,582.00	$639.50	$1,942.50	$1,942.50
	000-1312-00	Inventory Offset	$0.00	$0.00	$77,690.00	($77,690.00)	($77,690.00)
	000-1360-01	WIP - Material	$0.00	$0.00	$620.00	($620.00)	($620.00)
	000-2100-00	Accounts Payable	$0.00	$502,629.35	$114,164.37	$388,464.98	$388,464.98
	000-2101-01	Accounts Payable - Canada	$0.00	$250.00	$0.00	$250.00	$250.00
	000-2101-07	Accounts Payable - Singapore	$0.00	$0.00	$679.43	($679.43)	($679.43)
	000-2105-00	Purchases Discounts Available	$0.00	$1,578.73	$115.44	$1,463.29	$1,463.29
	000-2111-00	Accrued Purchases	$0.00	$113,179.81	$125,256.79	($12,076.98)	($12,076.98)
	000-2120-00	Commissions Payable	$0.00	$0.00	$14,874.13	($14,874.13)	($14,874.13)
	000-2150-00	Taxable Benefits Payable	$0.00	$0.00	$17,182.97	($17,182.97)	($17,182.97)
	000-2161-00	IL State Withholding Payable	$0.00	$0.00	$12,321.03	($12,321.03)	($12,321.03)
	000-2170-00	Federal Withholding Payable	$0.00	$0.00	$106,651.88	($106,651.88)	($106,651.88)
	000-2200-00	Payroll Deductions Payable	$0.00	$0.00	$23,686.83	($23,686.83)	($23,686.83)
	000-2300-00	IL State Sales Tax Payable	$0.00	$0.00	$18,732.84	($18,732.84)	($18,732.84)
	000-2310-00	Chicago City Sales Tax Payable	$0.00	$0.00	$3,122.26	($3,122.26)	($3,122.26)
	000-2320-00	GST Collected-Canada	$0.00	$0.00	$9,514.45	($9,514.45)	($9,514.45)
	000-2330-00	Australia Sales Tax Payable	$0.00	$0.00	$344.00	($344.00)	($344.00)
	000-2340-00	GST Collected -New Zealand	$0.00	$0.00	$54.98	($54.98)	($54.98)
	000-2740-00	Advances from Customers	$0.00	$27,500.00	$0.00	$27,500.00	$27,500.00
	000-2950-01	PPV - Unrealized	$0.00	$1,189.76	$1,189.76	$0.00	$0.00
	000-4100-00	Sales	$0.00	$0.00	$15,465.19	($15,465.19)	($15,465.19)
	000-4110-01	US Sales - Retail/Parts	$0.00	$0.00	$7,037.95	($7,037.95)	($7,037.95)
	000-4110-02	US Sales - Finished Goods	$0.00	$0.00	$472,876.05	($472,876.05)	($472,876.05)
	000-4140-00	US Sales - Repair Charges	$0.00	$0.00	$419.40	($419.40)	($419.40)
	000-4510-01	Cost of Goods Sold - Retail/Parts	$0.00	$248,654.43	$0.00	$248,654.43	$248,654.43

Multi-Dimensional Databases

1. System of Analysis, few Dimensions
2. Pre-Calculated
3. Slice and Dice

Relational Database Table

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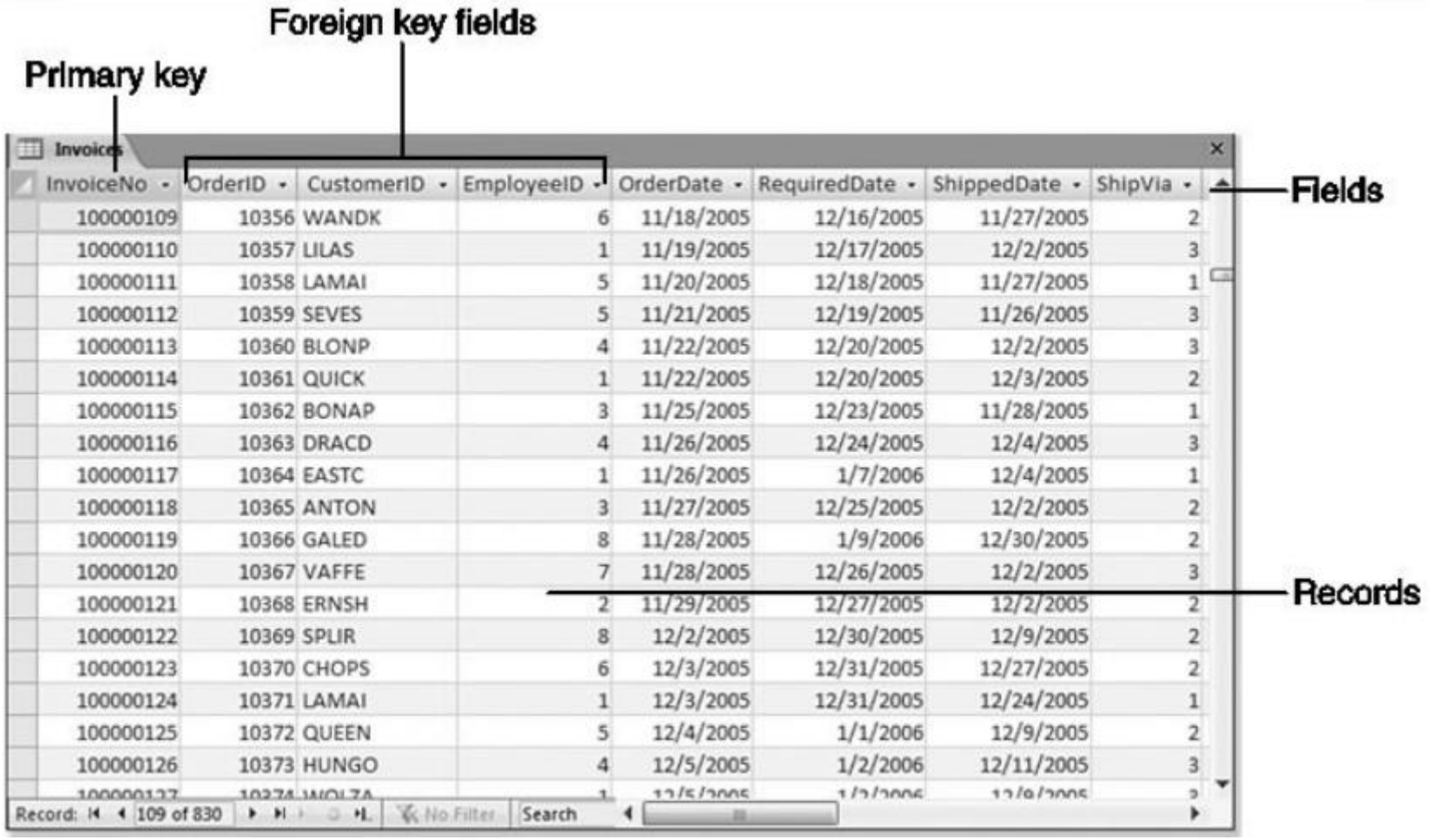

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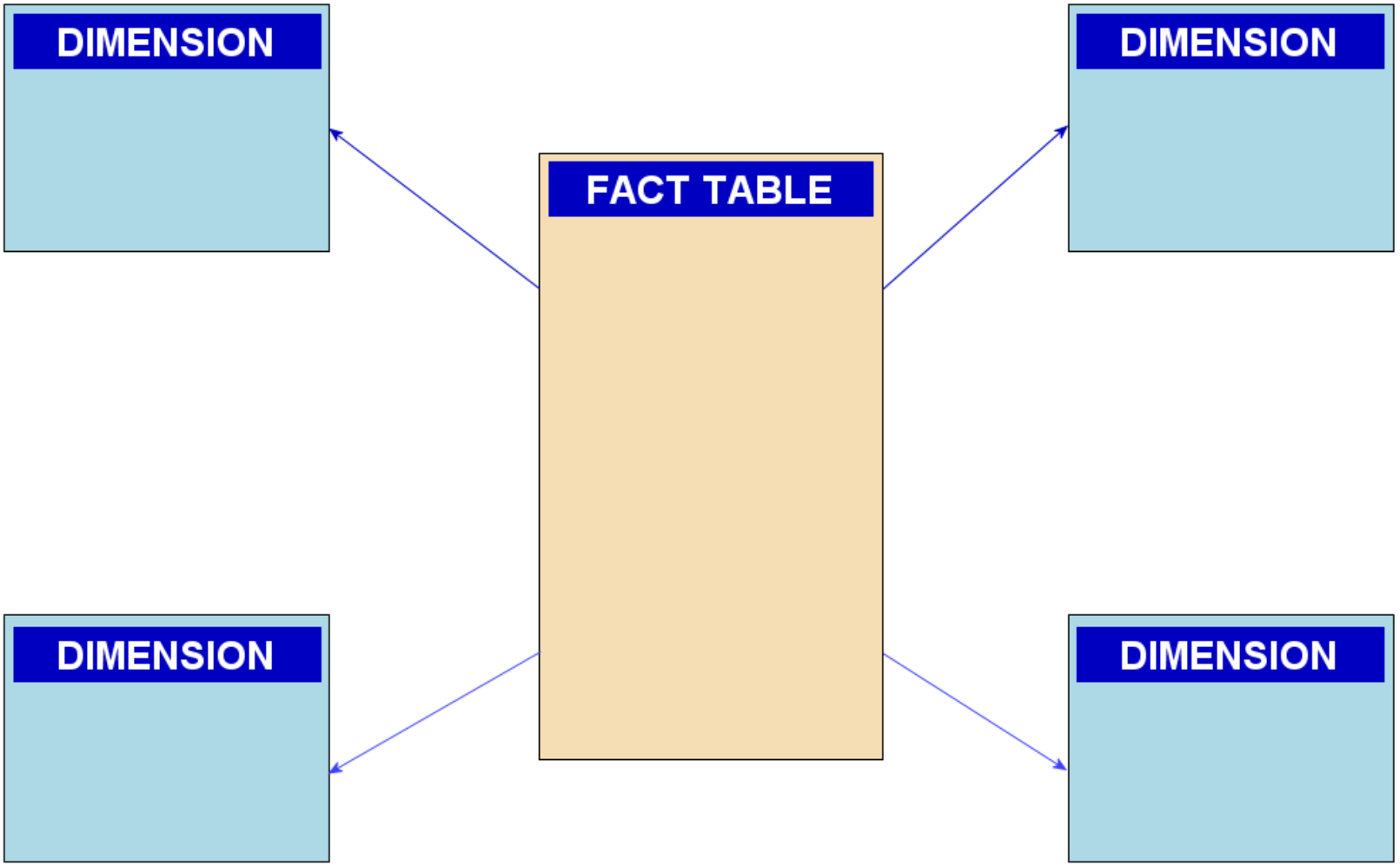
Multi-Dimensional – Star Schema



Data mapped to Star Schema

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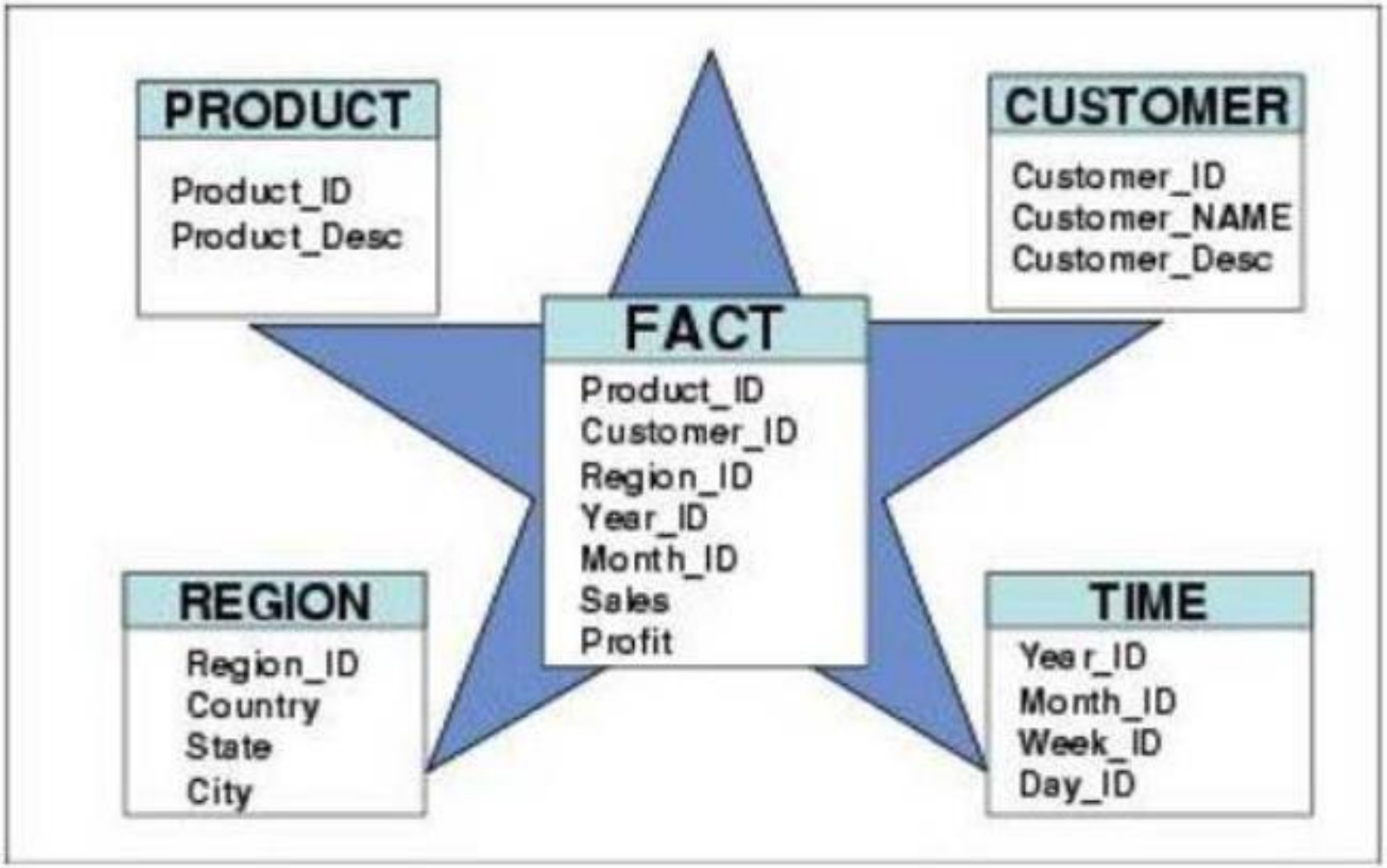
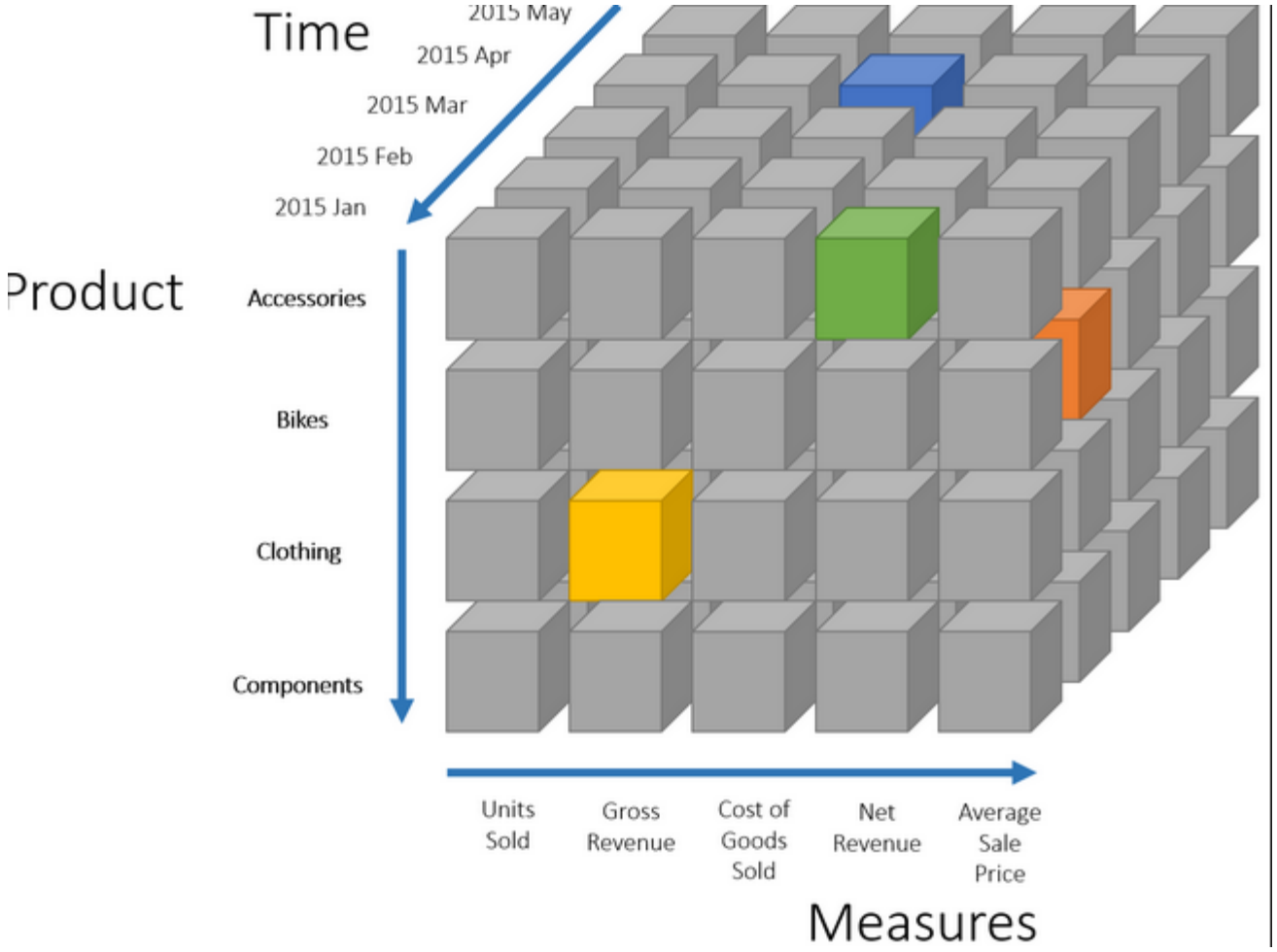


Stored in a Multi-Dimensional Cube



Performance

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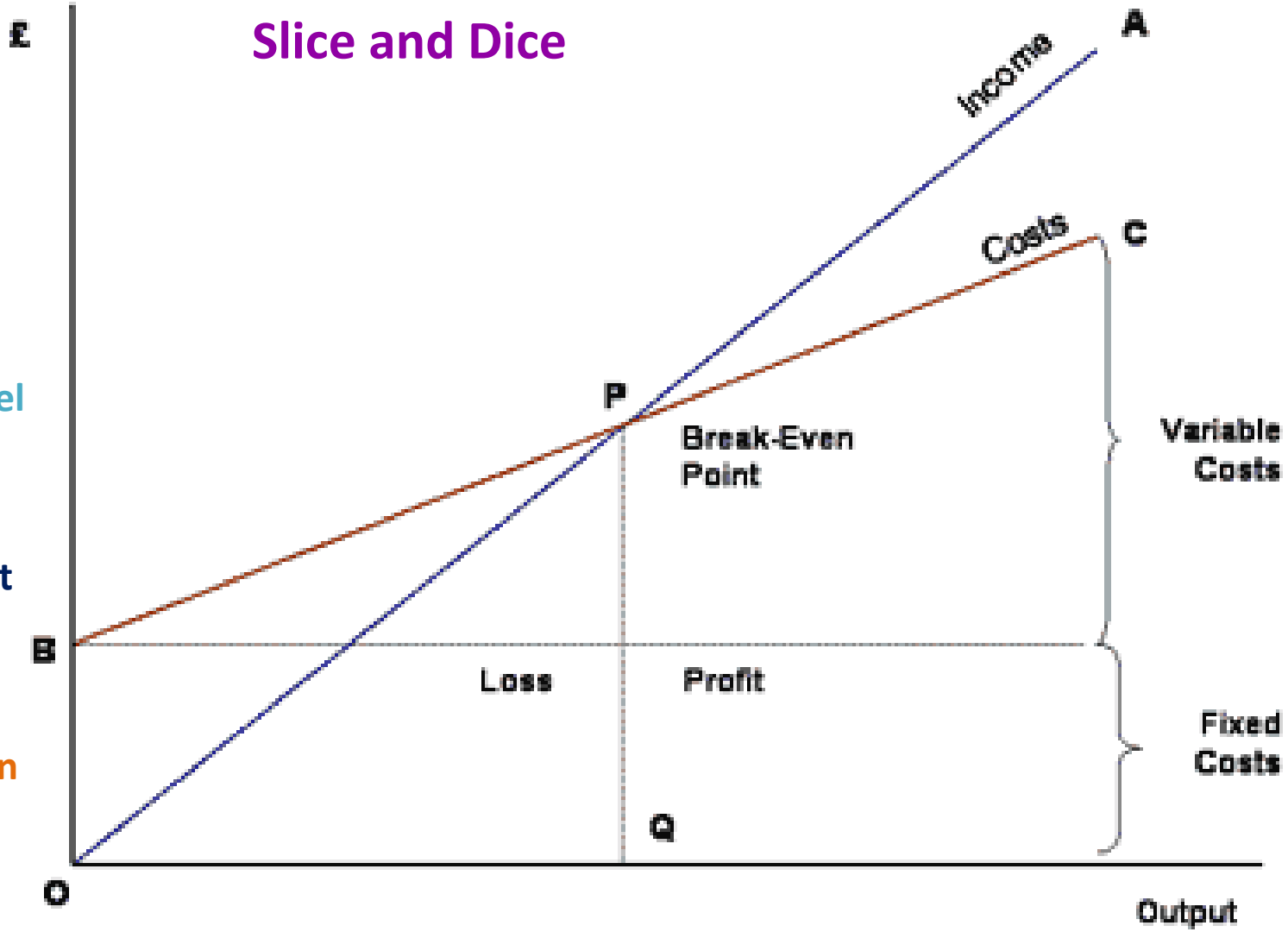
Dimension	# Total Members	# Detail Members	# Aggregate Members
Dimension1	10	8	2
Dimension2	100	75	25
Dimension3	500	450	50
Dimension4	10000	990	10

To calculate the total number of points in this cube, simply multiply all the members across all the dimensions: 10x100x500x10000=5000000000 or 5 billion. To calculate the number of detail members multiply all the detail members across all dimensions: 8x75x450x990=267300000 or 267 million. To get the number of aggregates subtract the number of total members from the detail members: 5000000000-267300000=4732700000 or 4.73 billion.

Cost Volume Profit – Slice and Dice



by Route

by Channel

by Aircraft

by Location

by Month

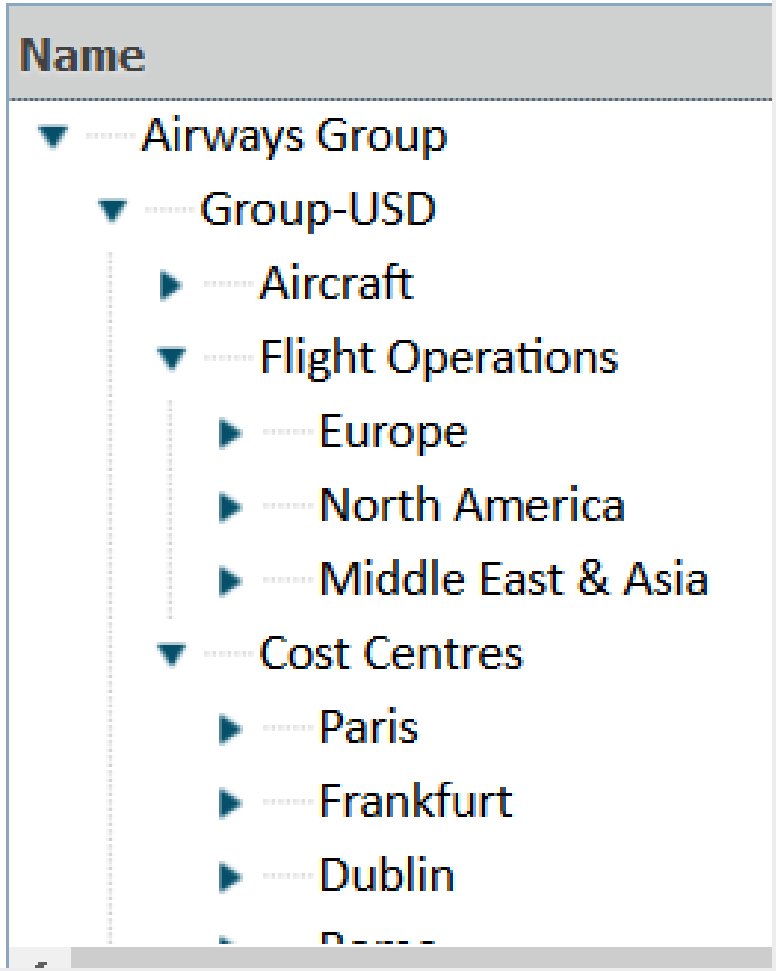
by Version

by Profit Centre

Making it a better model

1. Structure – How do we run the business, not cc's
2. Meaningful Dimensions – not 500 GL accounts!
3. Attributes – How do we want to build our rules and report
4. Drivers – The key to performance Management
5. Smart Calculations – If(condition, True, False)
6. Data – Fix it once not every time

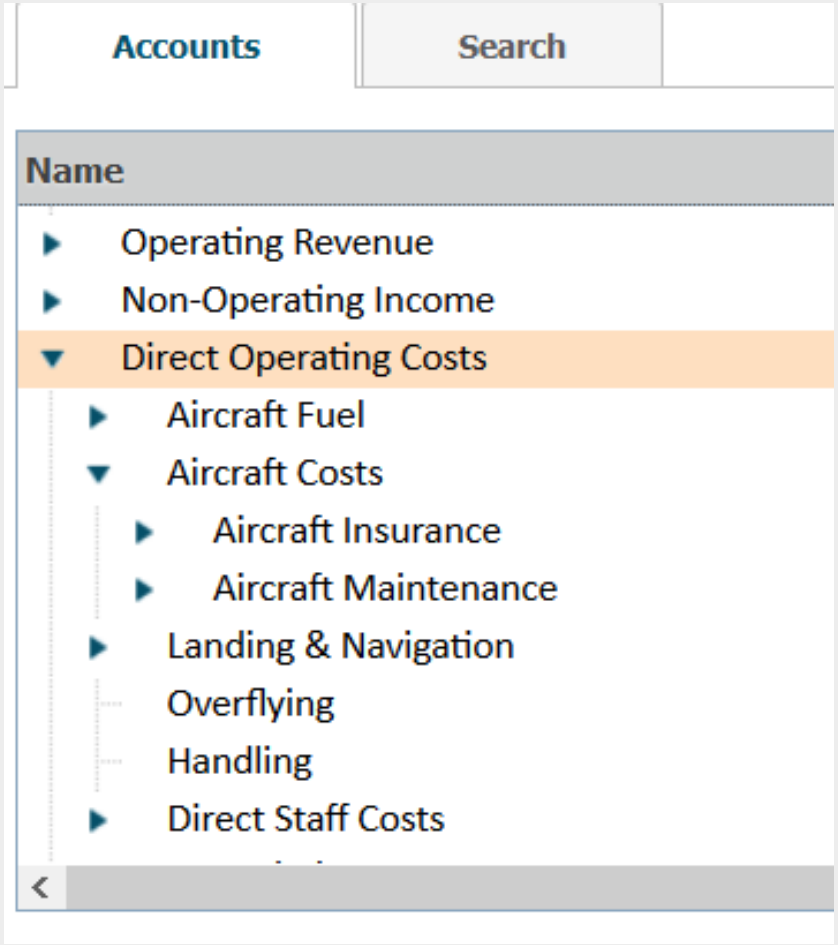
1. Structuring Levels– Quasi/Combined



Build it based on the business

it doesn't need to be uniform, generally where you need a P&L

2a. Dimensions – Relevant for Decisions



- Is it justified?

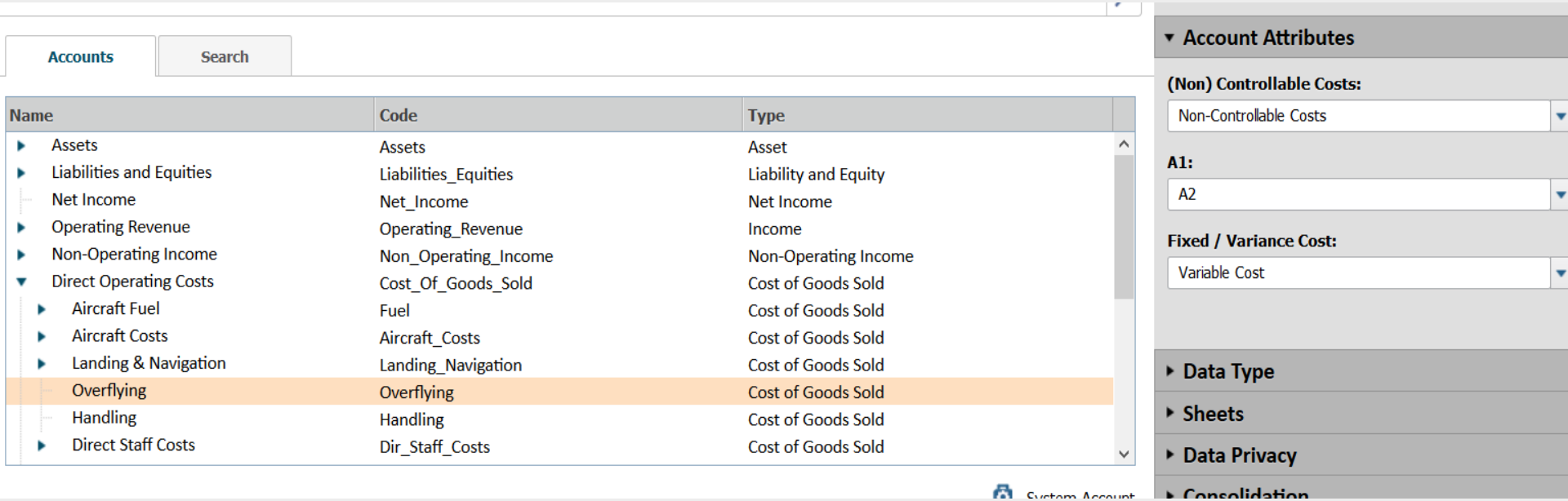
What is your proposed dimension?
What hierarchy does it encompass, or what hierarchy is it part of?
Is it independent? or part of another dimension?
Is this a 1:many relationship to other dimensions?
If yes, what other dimension might this be part of?
Do people need multiple ways to reference the members of the dimension?

2b. Dimension Members - Relevant Information

- Customer 1
  - Customer 1 Region A
  - Customer 1 Region B
  - Customer 1 Region C
- Customer 2
  - Customer 2 Region A
  - Customer 2 Region B
- Customer 3
- Customer 4
- Customer 5
- Customer 6
- Customer 7
- Customer 8
- Customers Less that 5% Revenue

Materiality focus and multi-dimensional view of cost structure, 80/20 by name and remainder by Market etc

3. Attributes

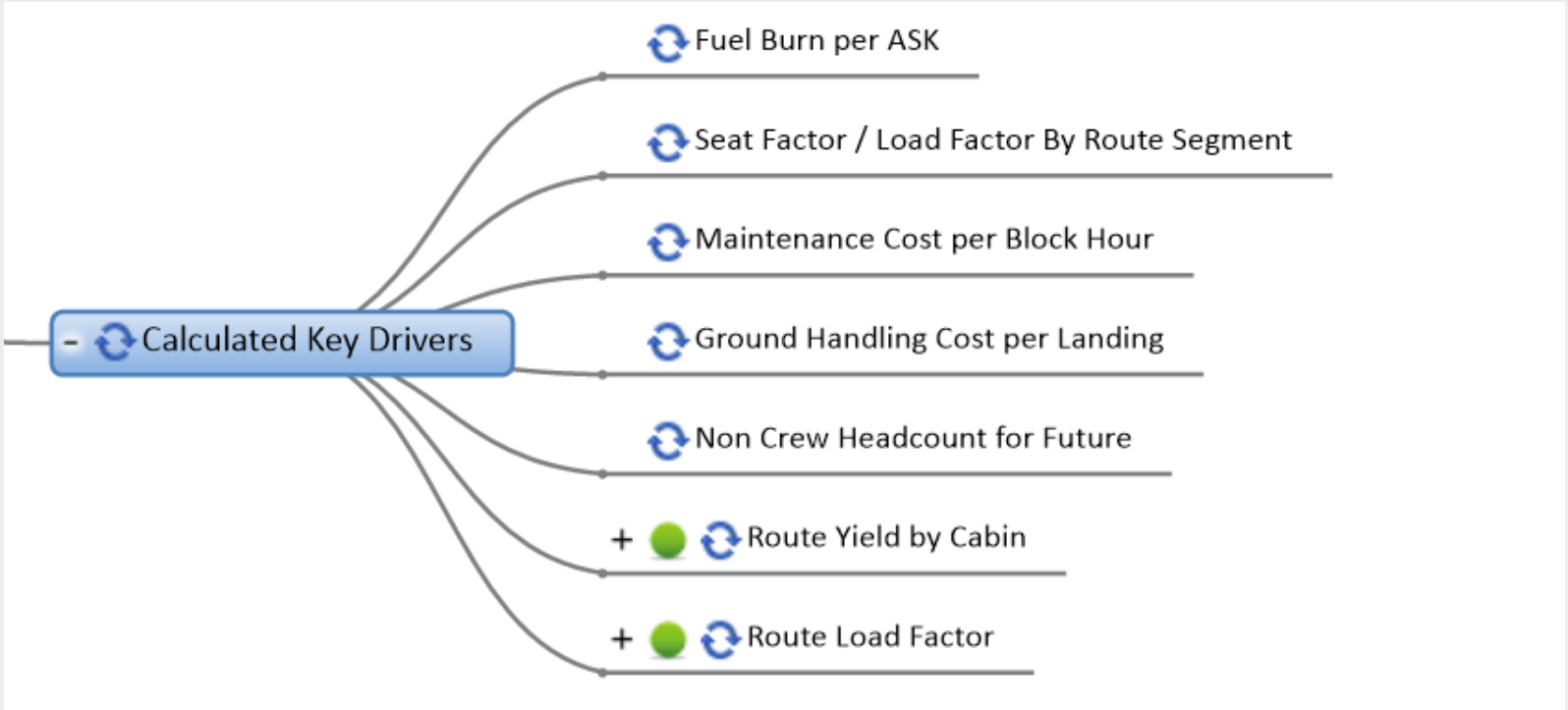


Attributes How else do we need to group our Dimensions for Reporting and Calculation purposes

Classify costs, Alternative P&Ls, not just Fixed/Variable but controllable/Non, contracted, ownership, existing or growth etc attributes

4. Driver Behaviour

- **Drivers** – make them known and place them on P&L and shorten P&L (Landings, Block Hours, FTEs, Passengers, Tonnes, Turnarounds)
- **Go through P&L** - ask what drives each item?



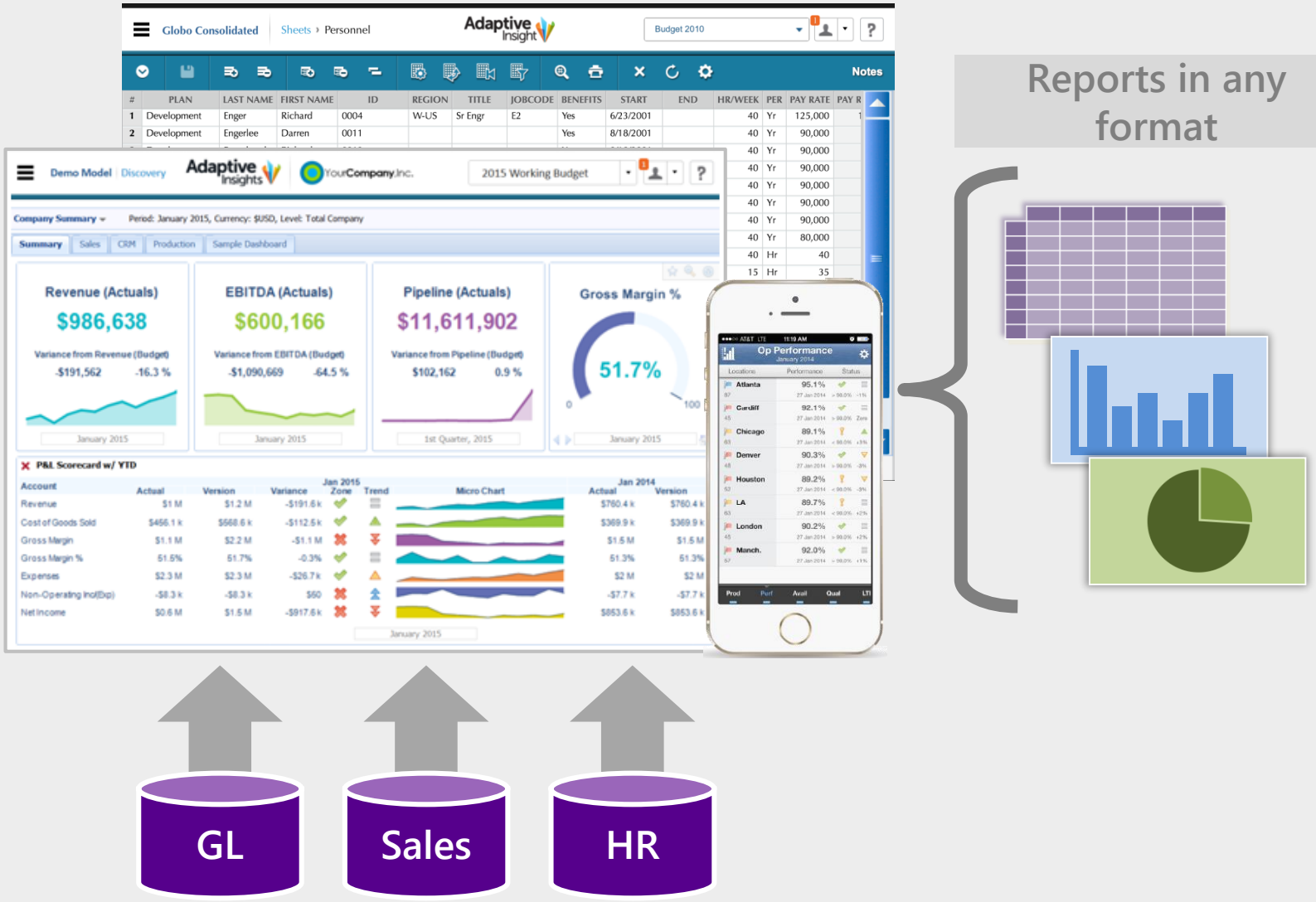
5. Formulas/Calculation/Logic

- If Statements - make them specific, not a catch all
- Don’t create long complicated calculations break them into steps
- Use Assumptions and drivers where practical
- Use switches to enable you to turn on and off calculations
- eg if(Active=1, calculate, take last month) etc

Data

- Spend time getting data collection automated
- Bring in Operational Data also
- Provide the data to other areas (Block hours should only exist once)
- Get external data into your model
- Decentralise it

On-Demand



Reports in any format

Many thanks for your time

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