

**Christian Brothers  
IT & Website Services**

**WEBINAR**

**2015 Fall Webinar Series**

**November 12, 2015**



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**Christian Brothers  
IT & Website Services**

**Introduction to Business Intelligence**

**November 12, 2015**



**2015 FALL WEBINAR SERIES**

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**Opening Prayer**

*Creator God, through your world  
and people that surround us, we  
pray that we may grow more aware  
this day of your life giving presence.  
Open our minds and hearts to apply  
the knowledge from today's  
webinar for the good of all.  
We ask these things in Jesus' Name.  
Amen*



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**Christian Brothers**  
**IT & Website Services**

**Introduction to Business Intelligence**



**Ed Hoff**  
Director of IT  
Christian Brothers Services



**Jose Hernandez**  
Director of Business Intelligence  
Dunn Solutions



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**Agenda**

- Introduction
- Setting the Stage
- Analytics
- The Data Warehouse
- Wrap it up and Q&A

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Dunn Solutions is a full-service IT consulting firm  
founded in 1988



**Minneapolis**  
Delivery - Training

**Chicago**  
Delivery

**St. Louis, MO**  
Training

**Raleigh, NC**  
Delivery - Training

**Bangalore, India**  
Delivery

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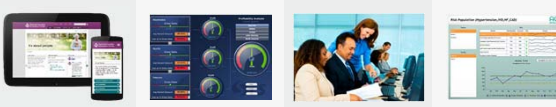
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### Practice Areas

### Solutions



#### Application Development

- Portals
- eCommerce & Content Managed Websites
- Mobile App Development
- Custom App Development

#### Business Intelligence

- Analytics & BI Platforms
- Data Warehouse & Data Integration

#### Predictive Analytics

#### Training

- Certified SAP/Liferay
- Classroom, On-site, Computer Based & Virtual
- Mentoring & Custom Training

#### Frameworks

- Accountable Care Orgs (ACO's)
- Corporate Legal
- Higher Education
- Optical Shop

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### Dunn Solutions Group Partnerships



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### Business Intelligence Practice

#### Business Intelligence

- KPI's
- Dashboards & Scorecards
- Ad Hoc Analysis
- Reporting

#### Business Analytics

- Data Mining
- Predictive Analytics
- Statistical Analysis

#### Big Data

- Hadoop, Hive, MapReduce
- Data Mining & Predictive Analytics
- Integrate data

#### Data Warehousing

- Data Integration
- Data Quality
- Dimensional Modeling

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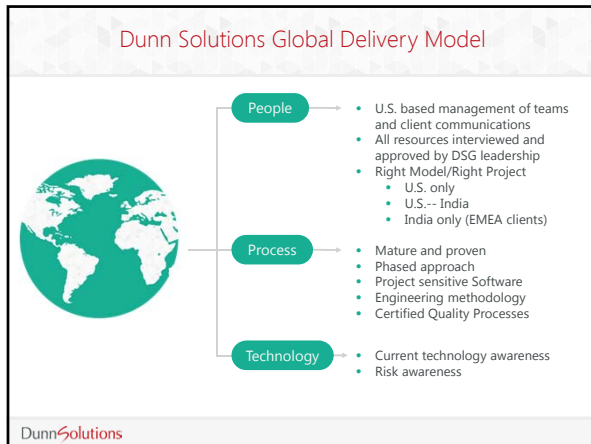
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### Jose Hernandez, Director of Business Intelligence

The screenshot shows Jose Hernandez's LinkedIn profile. He is the Director of BI at Dunn Solutions Group, based in Greater Chicago Area. His background includes roles at Dunn Solutions Group, Admiral Maintenance Service Co., and the University of Illinois at Chicago. The profile also features a post about Business Intelligence and a photo of him with other professionals.

www.linkedin.com/pub/jose-hernandez/507225a/

jose@dunnsolutions.com

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### Agenda

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### Setting the Stage

Business Intelligence (Analytics 1.0)

The goal of Business Intelligence is “to get the right information, to the right people, at the right time.”

Why?

- Make decisions based on data (not gut-feel)
- Support data driven business process
- Present customers with value-added options
- Sell products at the optimum price
- Staff for the appropriate work-load



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### Example – Higher Education

**Trend on Term Milestone**

- Analyze headcount on Registration Start, Term Start, 10th Day
- Term over term comparison
- Compare enrollment to same day a year ago, two years ago ...

**Student Cohorts**

- Dynamically assign students to cohorts
- Track students in original cohort
- Track students in current cohort
- Track graduation cohorts

**Financials**

- Dynamically assign students to cohorts
- Track students in original cohort
- Track students in current cohort
- Track graduation cohorts

**Acquisition & Retention**

- Understand where new students originate
- How many applicants become students?
- What are popular programs?
- Analysis by demographics
- Analysis by age group

**Student Progress**

- Find at-risk students
- What were their placement test scores?
- Did they have to take remedial level courses?
- Were those courses effective?

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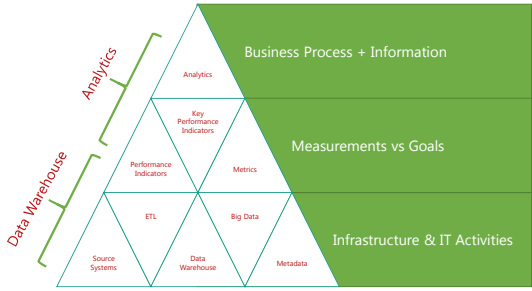
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### The Business Intelligence Pyramid



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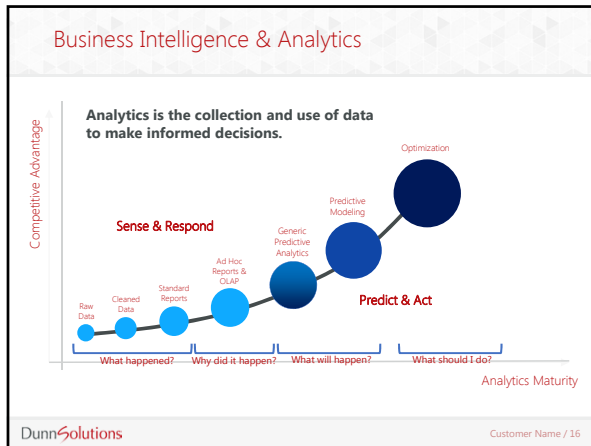
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### Terminology

Term	Definition
Business Intelligence	The collection of tools, techniques and methodologies used to transform raw data into meaningful information to make good decisions
Analytics	The collection and use of data to generate insight that feeds fact-based decision making
Metric	A measurement
Business Metric	A measurement based on business process
Performance Indicator	A business metric coupled with a business goal
Key Performance Indicator	A performance indicator tied to enterprise initiatives or mission statements

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### Terminology (continued)

Term	Definition
Data Mart	The data access layer of a data warehouse usually focusing on a business process
Data Warehouse	A system that extracts, cleans, conforms and delivers source data into a dimensional data store and then supports and implements querying and analysis for the purpose of decision making... ...“It’s the place where users go to get their data” <i>Kimball</i>
Big Data	A broad term used to define large data sets not typically handled by traditional data processing techniques; characterized by the three Vs (Volume, Variety and Velocity)

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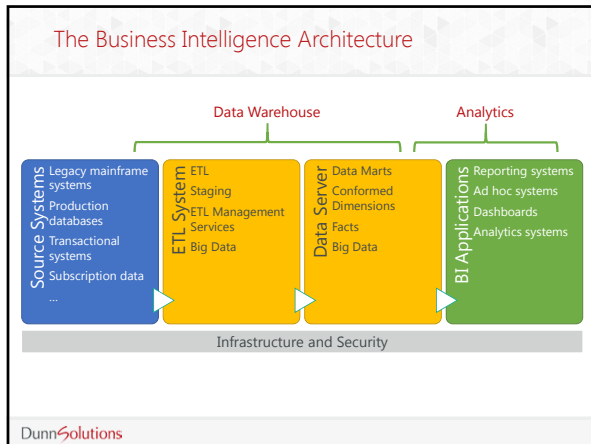
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### What is Big Data?

Analytics 2.0, **Big Data**

- So large and complex, traditional BI tools and techniques can't handle it
- Volume, Variety & Velocity (3Vs)

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### Big Data Challenge, Regular BI Doesn't Cut It

There is so much available data...

- the percentage of data an enterprise can consume and understand is dropping
- it is not cost-effective to store in traditional relational databases
- there is so much noise making it difficult to find the useful information

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### What does big data look like?

- Lots of it
- Not structured
- Lots of variety
- Text
- Images
- Rapidly changing

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### What is the Value of Big Data?

- eCommerce, social media, devices (IoT) are all producing huge amounts of data
- Looking at the data as a whole allows us to derive important information ...
  - offering customers products they are interested in
  - presenting the right price
  - fraud detection
  - prevent crime
  - real-time traffic conditions diseases control

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### Technologies to Handle Big Data

**Hadoop**

- Distributed file system and data processing (HDFS – Hadoop Distributed File System)
- High volume of data in any structure
- MapReduce programming paradigm
- Supports redundancy, distributed architecture and parallel processing

HortonWorks, Hive, Apache Pig, Impala, Apache Spark

**NoSQL (Not Only SQL)**

- Geared towards retrieval and appending data
- Key-value data stores
- Large volumes of unstructured data
- Schema-less architecture

MongoDB, Apache Cassandra, Solr, Splunk, HBase

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### The Business Intelligence Pyramid

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### Analytics

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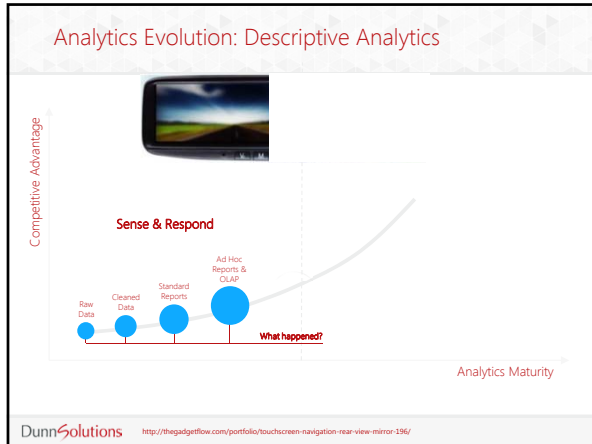
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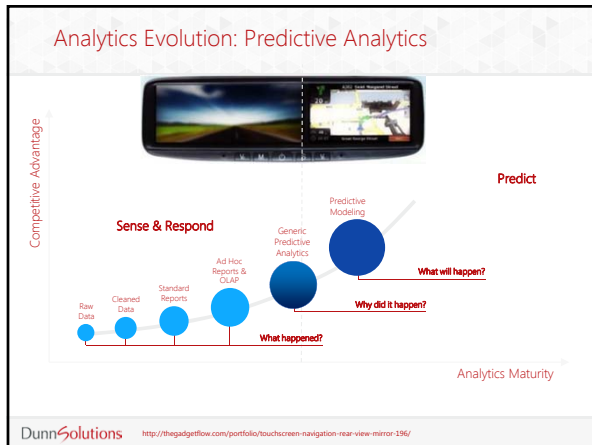
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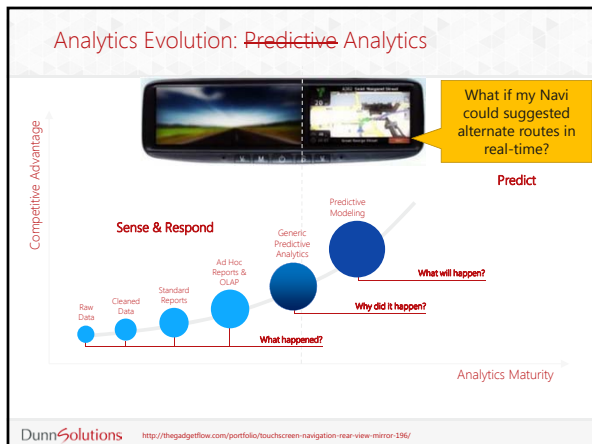
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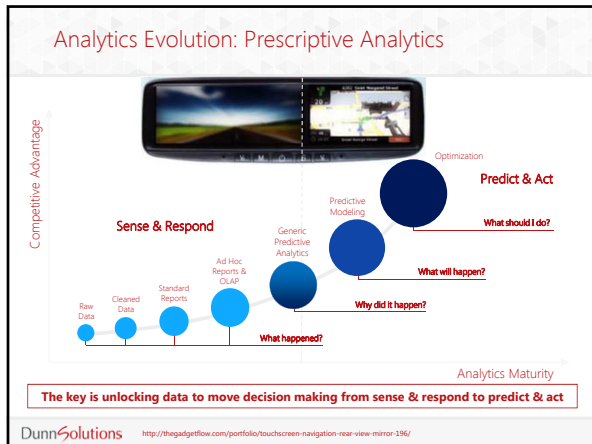
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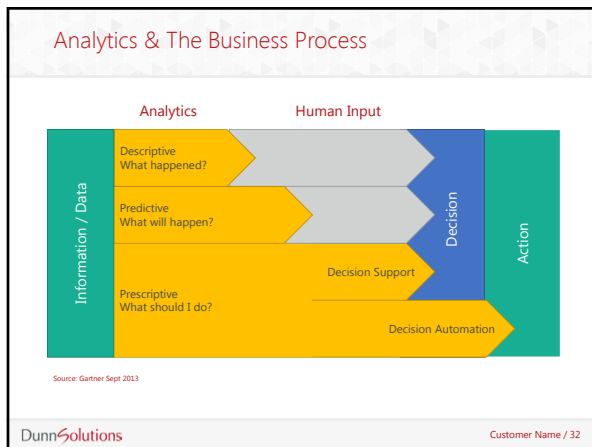
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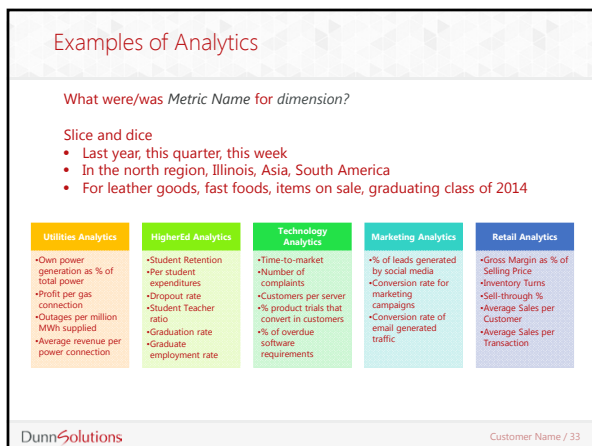
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### Performance Indicator & Key Performance Indicator

Metrics are the basis for performance indicators (PI) or key performance indicators (KPI).

Utilities Analytics	HigherEd Analytics	Technology Analytics	Marketing Analytics	Retail Analytics
<ul style="list-style-type: none"> <li>•Own power generation as % of total power</li> <li>•Profit per gas connection</li> <li>•Outages per million MWh supplied</li> <li>•Average revenue per power connection</li> </ul>	<ul style="list-style-type: none"> <li>•Student Retention</li> <li>•Per student expenditures</li> <li>•Dropout rate</li> <li>•Student Teacher ratio</li> <li>•Graduation rate</li> <li>•Graduate employment rate</li> </ul>	<ul style="list-style-type: none"> <li>•Time-to-market</li> <li>•Number of complaints</li> <li>•Customers per server</li> <li>•% product trials that convert in customers</li> <li>•% of overdue software requirements</li> </ul>	<ul style="list-style-type: none"> <li>•% of leads generated by social media</li> <li>•Conversion rate for marketing campaigns</li> <li>•Conversion rate of email generated traffic</li> </ul>	<ul style="list-style-type: none"> <li>•Gross Margin as % of Selling Price</li> <li>•Inventory Turns</li> <li>•Sell-through %</li> <li>•Average Sales per Customer</li> <li>•Average Sales per Transaction</li> </ul>

Quiz: How do you turn a metric into a performance indicator or key performance indicator?

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### Performance Indicator & Key Performance Indicator

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Quiz: How do you turn a metric into a performance indicator or key performance indicator?

Answer: Tie it to a corporate goal, or departmental goal or mission statement.

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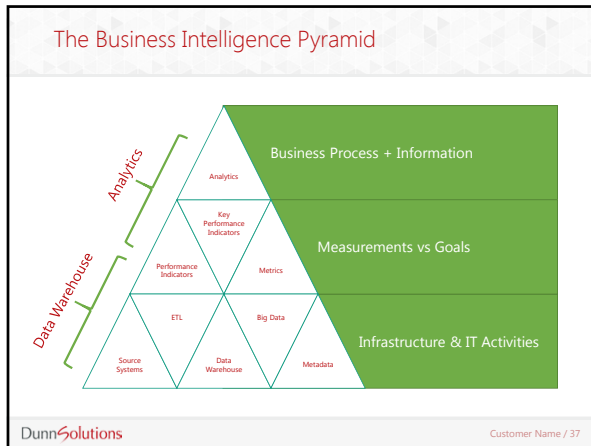
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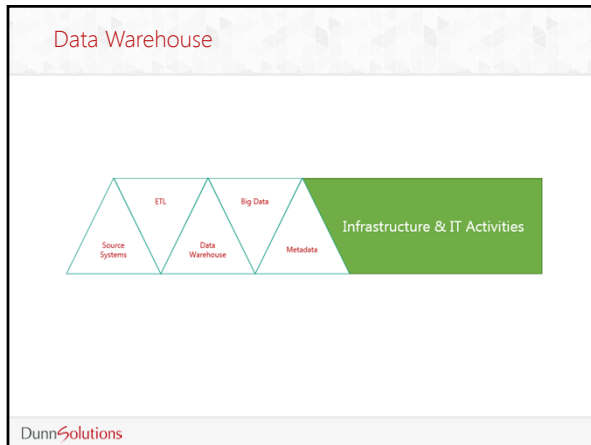
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### Goals of a Data Warehouse

- Make an organization's data easy to access
- Present the organization's data consistently
- Be adaptive and resilient to change
- Be trusted and secure
- Serve as the foundation for informed decisions
- Business community must accept the warehouse if it is to be successful

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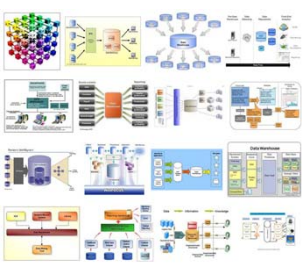
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What is a Data Warehouse?

- A simple question - does not seem to have a simple answer!
- Many definitions
- Two that you should consider
  - **Ralph Kimball**
  - Bill Inmon



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What is a Data Warehouse?

It is NOT ...

- A product
- A language
- A project
- A data model
- A copy of your transactional systems



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What is a Data Warehouse?

*"A data warehouse is a system that **extracts, cleans, conforms and delivers** source data into a **dimensional** data store and then **supports and implements querying and analysis** for the purpose of decision making..."*

Ralph Kimball

- Your users see the **"...querying and analysis..."** part ...
- They don't see the most complex part, **"...extracts, cleans, conforms, and delivers ...,"** but you will hear about it, if it's not working!

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### Operational Data Store vs Data Warehouse

<b>Operational</b> <ul style="list-style-type: none"><li>• One account/txn at a time</li><li>• Immediate Response</li><li>• Steady Load</li><li>• Mission Critical</li><li>• Getting data in</li><li>• Users: order entry, Cust. Svc</li><li>• Real-time</li><li>• History is difficult (if possible)</li></ul>	<b>Data Warehouse</b> <ul style="list-style-type: none"><li>• Millions accounts/txns at a time</li><li>• Multi-second Response OK</li><li>• Occasional, ad-hoc queries</li><li>• Important, sometimes Mission Critical</li><li>• Getting data out</li><li>• Users: mgmt, marketing, etc.</li><li>• Snapshot, point-in-time</li><li>• History is easy</li></ul>
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### Dimensional Modeling

**Dimensional modeling is a technique which allows you to design a database that meets the goals of a data warehouse.**

**Steps**

- Identify Business Process
- Identify Grain (level of detail)
- Identify Dimensions
- Identify Facts
- Build Star

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### Identify the Grain

Grain is the level of detail stored in the data warehouse.

- Do we store all products, or just product categories?
- Each month, week, day, hour?
- Has a big impact on size of database.

Can be a different grain for each fact.

Typically implement the lowest possible dimension grain: not because users need to see individual records, but because they want to aggregate those records in many different ways.

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### Identify Dimensions

- Selection Criteria (where Gender="Female")
- Row Headers ("College Name", "Region", ...)
- How do you want to slice the data?
- What are the artifacts of your business?
- Time Dimension - Always present
- Conforming Dimensions – very important aspect of a successful data warehouse!

Customer

Location

Product

Sales Person

Time

Promotion

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### Identify the Facts

- Counts, Sums
- Additive
- Non-Additive
- Semi-Additive
- Fact-less Facts

Customer

Sales

Location

Product

Inventory

Sales Person

Time

Promotion

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### Create the Stars

Why is it called a star?


Time Dimension
Order Date
Year
Quarter
Month

Product Dimension
Name
Category
Price

Fact Table
Total
Quantity
Freight
Discount

Customer Dimension
Name
Address
City
Zip

Employee Dimension
Name
Supervisor
Department
Region
Territory



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### Conformed Dimensions / Bus Architecture

Business Process	Business Priority	Conformed Dimensions																
		Date (Order, Ship, Pay)	Product	Promotion	Customer	Employee	Place	Internal/Resi- tional User	Part	Vendor	Shipper	Problem						
Orders Forecasting	2	X	X	X	X	X												
Orders	1	X	X	X	X	X												
Purchasing		X	X		X	X												
Parts Inventory		X	X	X									X	X	X			
Manufacturing	6	X	X										X					
Finished Goods Inventory		X	X	X														
Shipping		X	X	X	X	X												X
Returns	5	X	X		X	X												X
Registration Cards		X	X		X	X												
Customer Calls	4	X	X	X	X	X							X					X
Web Support		X	X	X	X	X												X
Financial Forecasting		X	X	X	X	X	X	X									X	
Exchange Rate Management	3	X																

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### Comparison of Fact Table Types

Characteristic	Transaction Grain	Periodic Snapshot Grain	Accumulating Snapshot Grain
Time period represented	Point in time	Regular, predictable intervals	Indeterminate time span, typically short-lived
Grain	One row per transaction event	One row per period	One row per life
Fact table loads	Insert	Insert	Insert and update
Fact row updates	Not revisited	Not revisited	Revisited whenever activity
Date dimensions	Transaction date	End of period date	Multiple dates for standard milestones
Facts	Transaction activity	Performance for predefined time interval	Performance over finite lifetime

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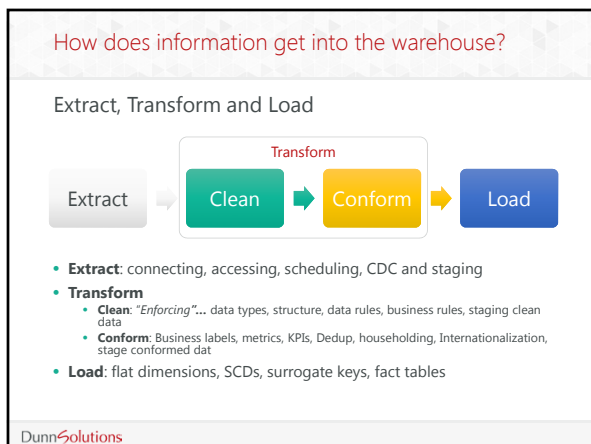
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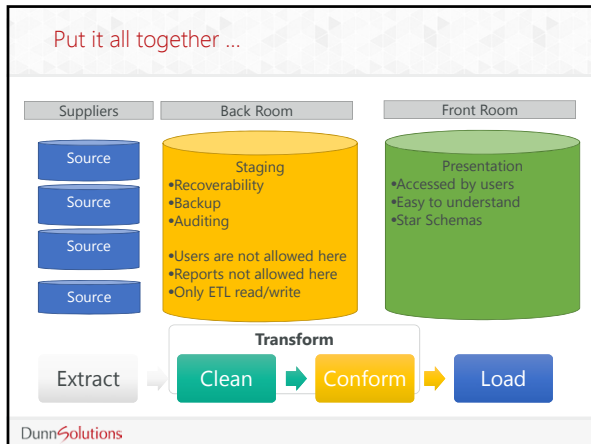
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### Querying the Dimensional Model

SQL is by far the most common means of querying the dimensional model:

Example SQL

```

Select store_name, product_category_name, sum (dollar sales)
From Sales_Fact a, Store_Dim b, Product_Dim c, Time_Dim d
Where a.Store_skey = b.Store_skey
      and a.Product_skey = c.Product_skey
      and a.Time_skey = d.Time_skey
      and d.calendar_year = 2002
      and d.month_of_year = 12
group by store_name, product_category_name
    
```

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### Teach SQL to our end users?

- Querying the dimensional model is by far more straightforward than querying the transactional data model.
- Do we have to teach how to create a Select statement to our end users?

Nope:  
Enter BI Tools and Applications

DunnSolutions Thank you Staples for the easy button!

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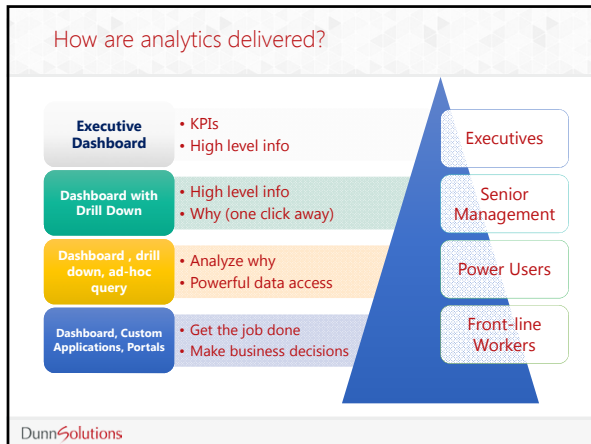
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- ### Agenda
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- ### What's Next
- Are you taking advantage of analytics in your organization?
  - Are you able to provide metrics, performance indicators and key performance indicators to the right people?
  - Is your data warehouse meeting your needs?
  - Are you having trouble with user adoption?
- Need help with any of these? Please let us know at [info@dunnsolutions.com](mailto:info@dunnsolutions.com)
- Or you can reach out to me! [jose@dunnsolutions.com](mailto:jose@dunnsolutions.com)
- DunnSolutions

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<https://www.cbsecurities.org/educationalresources.php>

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