

**Erasmus School of Economics
Econometric Institute**

Introduction to Business Intelligence
The journey through the BI architecture from
Raw Data to Fancy Reports and Dynamic Dashboards

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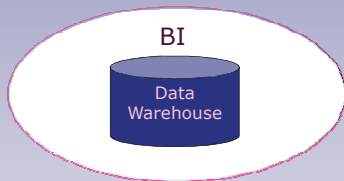
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Introduction to Business Intelligence
The journey through the BI architecture from
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abstract

- This seminar will introduce the BI architecture, from the very beginning showing systems components up to finally presenting business results and indicators using reports techniques. It is the journey of the raw data from source systems being transformed into relevant business information presented in a modern way on reports and dynamic dashboards. All BI-systems components will be briefly discussed, special attention is given to relevant aspects such modeling choices and user security. After the raw data is transformed and loaded into the data warehouse, a very important factor in BI success is the analyst's choice of reporting and measures, such as (key) result indicators, performance indicators and key performance indicators. Therefore indicators and reporting will receive a special attention during the seminar. Finally it will be presented a series of types of reports and best uses for graph types and dynamic dashboards.
- Key words: architecture, data warehouse, modeling, business indicators, reports, graphs, dynamic dashboards

What is Business Intelligence?



- "A data warehouse is a subject oriented, integrated, time variant, nonvolatile collection of data in support of management's decision-making process" Bill Inmon
- "A data warehouse is a copy of transactional data specifically structured for query and analysis" Ralph Kimball
- BI is the process of transforming data into usable information and knowledge 3

Who uses BI?

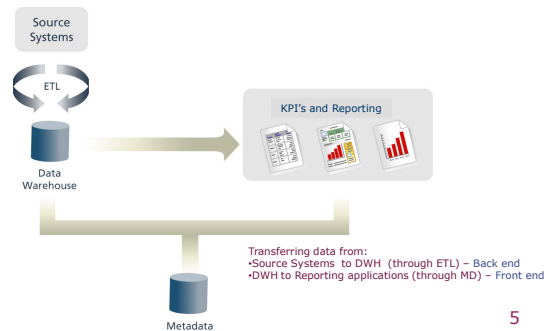


- Analytical Competitors use BI, they have lots of data, they organize it and put it in DWH. They integrate the data in areas of their business where it really matters.
- In domain where decisions must be made quickly or very often, BI will embed analysis into decisions systems.
- They make lots of money!
- They will lead us into the future!

Source: Davenport & Harris, 2007. Competing on Analytics: the new science of winning. Harvard. USA. 215p.

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Introduction to Business Intelligence
General Architecture



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sustainable business development
A general framework for sustainability evaluation
and choice of business indicators

STEP	DESCRIPTION
1	Description of a business (example: production system)
2	Identification of EES issues (Economic, Ecologic, Social)
3	Choice of indicators
4	Measure sustainability indicators
5	Evaluation and monitoring

Source: Waltrick, B. 2003. Contribution of Holstein Cows to Sustainability of Dairy System in Brazil. PhD Thesis, Wageningen Universiteit, Nederland. p 184

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Types of performance measures:

- Key result indicator (KRIs) tell you how you have done in a perspective or critical success factor
- Result indicator (RIs) tell you what you have done
- Performance indicators (PIs) tell you what to do
- KPIs tell you what to do to increase performance dramatically



Source: Parmenter, D. 2010. Key Performance Indicators: developing, implementing, and using winning KPIs. Wiley & Sons, Inc., Hoboken, New Jersey, 2nd ed., p 300. 7

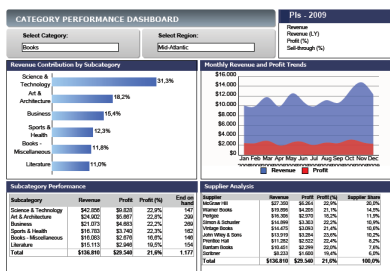
Balanced Scorecard



Sources: KAPLAN & NORTON, 1996. The balanced Scorecard :Translating Strategy into Action. Boston : Harvard Business School press.
PARMENTER, D. 2010. Key Performance Indicators: developing, implementing, and using winning KPIs. Wiley & Sons, Inc., Hoboken, New Jersey, 2nd ed., p 300. 8

Scorecards and Dashboards

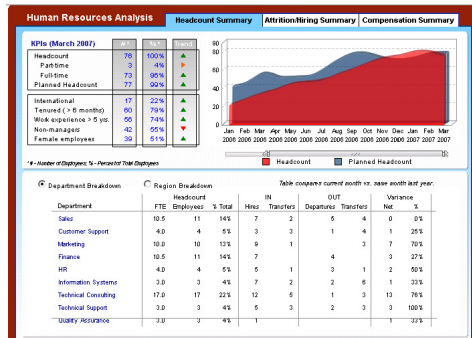
This dashboard evaluates category performance by region. It includes revenue and profitability details by subcategory and supplier.



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Scorecards and Dashboards

Multiple Dashboards in a Single Document



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Enterprise Reporting

Classic production and operational report that lists the sales cost and profit margins for various categories across different regions.

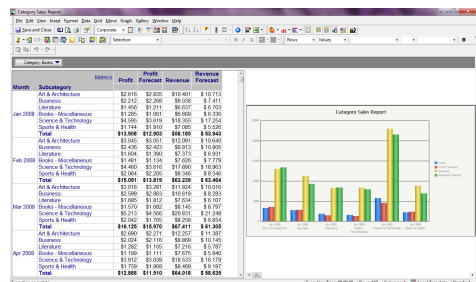
Category Sales and Profit Performance

Category	Subcategory	Revenue	Profit	Profit %	Revenue	Profit	Profit %
Oct 2009	Books	\$2,798	\$754	27.0%	\$2,200	\$573	26.0%
Nov 2009	Books	\$2,444	\$658	26.9%	\$2,210	\$601	27.2%
Dec 2009	Books	\$3,114	\$840	27.0%	\$2,434	\$651	26.7%
Jan 2010	Books	\$2,879	\$754	26.2%	\$2,210	\$601	27.2%
Feb 2010	Books	\$2,275	\$601	26.4%	\$1,546	\$407	26.3%
Mar 2010	Books	\$2,879	\$754	26.2%	\$2,210	\$601	27.2%
Apr 2010	Books	\$2,879	\$754	26.2%	\$2,210	\$601	27.2%
May 2010	Books	\$2,879	\$754	26.2%	\$2,210	\$601	27.2%
Jun 2010	Books	\$2,879	\$754	26.2%	\$2,210	\$601	27.2%
Jul 2010	Books	\$2,879	\$754	26.2%	\$2,210	\$601	27.2%
Aug 2010	Books	\$2,879	\$754	26.2%	\$2,210	\$601	27.2%
Sep 2010	Books	\$2,879	\$754	26.2%	\$2,210	\$601	27.2%
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Slice and Dice Analysis

This report displays revenue and profit information by month for a particular category and subcategory. The category of interest is selected at the top



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Advanced and Predictive Analysis

This dashboard analyzes certain demographic factors about each customer who are likely to churn (factors that determine the steady-state level of customers a business will support).

Churn Risk Analysis by Demographics

Spendables

Region	Spentables
South	\$120,000
North	\$100,000
Mid	\$80,000

Breakdown by Region

Region	Spentables	Churned
South	\$120,000	\$100,000
North	\$100,000	\$80,000
Mid	\$80,000	\$60,000

Customer Scorecard for Felix Eckstein

Revenue: \$100,000
 Profit: \$20,000
 Churn Rate: 20%

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Alerts and Proactive Notification

Reports can be designed to alert managers to business exceptions

Inventory by Subcategory

Alert appears when certain business conditions are not met.

Category: Electronics
 Subcategory: Computers

Items > 2 months of supply: 15
 Value of Excess Inventory: (\$22,513)
 Value of Inventory on Hand: \$17,671

Alert: Inventory value reduced from previous month - monitor products for which inventory is falling below target.

SKU	Item Description	Units on Hand	Unit Cost	\$ on Hand	Months of Supply	Target	Excess
121	Microsoft Desk Mouse 1.5	22	\$39	\$858	41	0.3	(1)
122	Microsoft Natural Keyboard Elite V.2.0	5	\$44	\$220	42	0.3	(2)
123	New Media 64 MB Compact Flash	18	\$36	\$648	43	0.4	(3)
124	New Media 64 MB Compact Flash	19	\$146	\$2,774	22	0.9	(1)
125	New Media 32 MB Smart Media	14	\$71	\$994	42	0.5	(1)
126	3COM 966 Cellular Modem PC Card	5	\$141	\$705	21	0.2	(1)
127	3COM 16000 Ethernet 10/100/1000	6	\$333	\$1,998	21	0.3	(1)
128	3COM 16000 Ethernet	6	\$117	\$702	22	0.3	(1)
129	3COM Networking Kit	20	\$92	\$1,840	21	1.6	(1)
130	3COM Networking Kit	21	\$106	\$2,226	22	0.5	(1)
131	3COM Networking Kit	21	\$106	\$2,226	22	0.5	(1)
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200	3COM Networking Kit	21	\$106	\$2,226	22	0.5	(1)

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Advanced Visualizations

- Interactive Stacked Area Chart
- Interactive Bubble Plot

Region

Region	Display	Revenue
Northeast	<input type="checkbox"/>	\$300,000
Mid-Atlantic	<input type="checkbox"/>	\$280,000
Southeast	<input type="checkbox"/>	\$240,000
Central	<input checked="" type="checkbox"/>	\$200,000
South	<input checked="" type="checkbox"/>	\$180,000
Northwest	<input checked="" type="checkbox"/>	\$120,000
Southwest	<input type="checkbox"/>	\$80,000
Web	<input type="checkbox"/>	\$40,000

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Advanced Visualizations:

Single-Value Visualizations

- Gauge
- Thermometer
- Cylinder

REVENUE

Revenue: \$1,600K

Participation

Participation: 70%

Units Sold (in Millions)

Units Sold: 26M

Time Series Slider

Daily Revenue

7/7/2004 to 11/6/2004

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Best Uses for Graph Types

- Time series comparisons:

Quarterly Trends

Quarter	Leads	Qualified Leads
2006 Q1	164	74
2006 Q2	166	76
2006 Q3	165	75
2006 Q4	164	74

Revenue Performance

Monthly: \$1,600,000
 Quarterly: \$4,800,000

Curved Lines

Revenue: \$1,600,000
 Revenue Forecast: \$1,600,000

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Best Uses for Graph Types

- Frequency distribution:
- Targets and quota:

Histogram - Showing Normal Distribution of Orders Placed by Customers

Number of Customers: 200

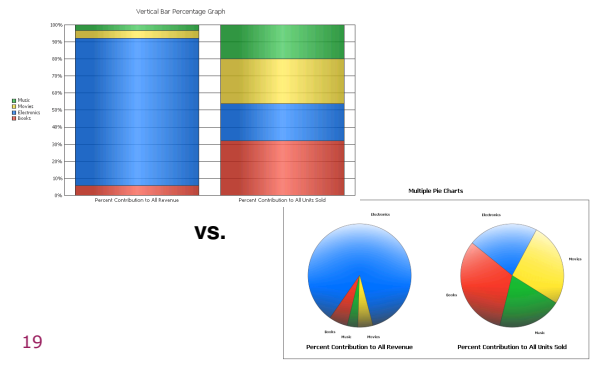
Revenue vs Quota for Alert

Quarter	Revenue	% Quota Achievement	Target Quota
2005 Q4	\$1,000,000	100%	\$1,000,000
2006 Q1	\$1,200,000	120%	\$1,000,000
2006 Q2	\$1,400,000	140%	\$1,000,000
2006 Q3	\$1,600,000	160%	\$1,000,000
2006 Q4	\$1,800,000	180%	\$1,000,000
2007 Q1	\$2,000,000	200%	\$1,000,000

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Best Uses for Graph Types

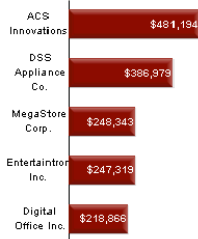
- Component comparisons for Components



Best Uses for Graph Types

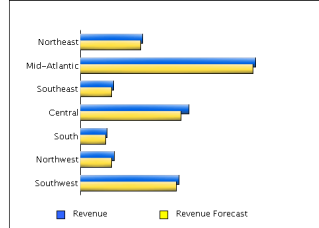
- Item comparisons:

Top 5 Suppliers of Electronics



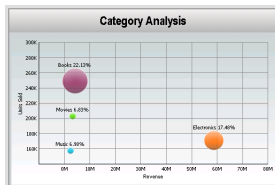
Bevel Effects

Revenue vs. Forecast



Best Uses for Graph Types

- Correlation comparisons:



Gradients :

