Data Warehousing in Telecom Italia

Company-wide Usage of a new Technology to support Business Intelligence

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- Company-wide databases - preferred architecture, implementation strategy, and current status of populating data
  - Introduction of Data Warehouses to support “Customer Relationship Marketing” processes and Business Intelligence Systems (BIS, MIS, DSS)
  - Data Warehouse architecture and implementation methodology
  - Projects completed and/or under development
  - Introduction to deploying Data Mining Projects
  - Conclusions
Exploiting Company Data as Strategic Assets
to ensure that Application Development
is consistent with the Evolution of
Business Requirements
Key element for success: Primary DW’s resulting from BDA

Company Data bases and legacy systems

Primary Data Warehouse for Consistency Analysis per Customer

Primary Data Warehouse for Traffic Analysis

Marketing

Fraud Management

Sales

Customer Care

Company Data bases and legacy systems

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Data Warehouses and Business Intelligence Systems (BIS, MIS, DSS) ... Focusing on the global usage of company information

- The Data Warehouses, populated with company information and organized in Large Data Bases, constitute the technical infrastructure required to:
  - Support the Customer behavior analysis concerning the use of services, products, discounts, and traffic (Customer Profiling)
  - Support Customer Relationship Marketing Systems (new strategies to manage customers) and Business Intelligence Systems
  - Support the analysis, forecasting, and execution of simulation scenarios (DSS)
  - Support Data Mining tasks

  In general

  - Data Warehouses support the Marketing, Sales, and Customer Activities
Data Warehouses and Business Intelligence Systems (BIS, MIS, DSS) ... switching from Events to Company Facts

The large amount of information produced by the operational systems, usually transactional systems, is re-organized using additional Business Rules (Facts) in order to provide an effective operating support to “Business Managers” for their Marketing, Sales, and Customer Management activities.

**AS A MATTER OF FACT**

*Since the operational systems manage the Events generated by the Business operating processes (marketing, provisioning, etc.), they cannot be used to foresee the customers’ answer to the new offerings and their usage.*
Data Warehouses and Business Intelligence Systems (BIS, MIS, DSS)... switching from Operational Data to Business Intelligence Information

**OPERATIONAL DATA** generated by the EVENTS of BUSINESS Processes

Data Generated by company FACTS

**BUSINESS INTELLIGENCE INFORMATION**

- Analysis
- Aggregated Data for Marketing
- Aggregated Data for evaluation and forecasting models
- CAMPAIGNS Planning and Management
- DISCOUNTS Planning and Management
- Customer Profiling Strategies
- Aggregated Data for Sales
- Customer Segmentation cross selling
- BD BUNDING Development and maintenance

Data Transformation through the operating Business rules

- Operations on products/services/discounts
- Products/services/discounts Consistency
- Invoices
- Credit
- Other data

Data Transformation through new Business Intelligence RULES

**SPECIALIZED DATA**

- Company centralized/unique information

**SPECIALIZED Information to support BUSINESS INTELLIGENCE**
Data Warehouses and Business Intelligence Systems (BIS, MIS, DSS)... volume of operational data entry into the Databases of the Primary DWH’s

- ~ 23 millions CUSTOMERS
- ~ 22 ML ACTIVE SITES
- ~ 25 ML active telephone SUBSCRIPTIONS
- ~ 25 ML CONTRACTS
- ~ 200 thousand data transmission lines
- ~ 40 ML CONTRACTS for Products
- ~ 10 ML discount CONTRACTS
- All the managed phone cards
- ~ 120 ML CDR/days (DIA)
- ~ 50 ML CDR/days (Interconnection)
- ~ 300 thousand job orders/days
- ~ 24 ML Customer INVOICES
- ~ 10 millions unpaid Invoices
In short ... the reasons for implementing Data Warehouses in Telecom Italia

- The integration of data generated by different operational processes produces new information which supports the tasks aiming at managing the company business

- The infrastructure is useful in order to implement:
  - Decision and Business Intelligence Support Systems
  - ”Mass” distribution of company information
  - Time trend comparisons
  - Forecast and Simulation Scenarios
  - Data Mining (customer segmentation, fraud forecasting, ...)

- The architecture is perfectly integrated with INTERNET technologies
In short ... activities to implement Data Warehouses since 1998 till today

- BDA population with data from Legacy Systems
- Launch of Primary Data Warehouses
- Implementation of Secondary DW’s
- Implementation of DWP interconnection Traffic
- Implementation of DWP Customer
- Implementation of DWP Traffic

1998 99 00
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Data Warehouse Architecture

**Legend**

- **= Data Transfer Middleware**
- **= Intranet / Internet**
- **= LAN / WAN**
- **= Information Flow**

**Source Systems (BDA/Legacy)**
- Data Preparation / Cleaning
- Staging Areas, Delta, Temporary Areas

**Data Transformation**
- RDBMS
- Metadata

**Primary DW**
- E R schema
- Star schema

**Information Support**
- (Data Mining)

**Multidimensional Analyses**
- (Query & Reporting, OLAP)

**Warehouse Management**
- Research Users
- Power Users
- Knowledge User
Enterprise Data Warehouse ...what is running

- DW Traffic
  - Traffic (Intergestore) 98/07
  - DIA Traffic 99/10
- Other typologies
- DW Network
- DW Customer
  - P/S Consistency 99/11
  - Invoices 99/10
  - Credits, Proceeds 99/11
- DW Administration

Analysis Dimensions
- Cus
- Prod
- Se
- Subscript
- Territory
- Orga
- Contrac
- Ti
- In
- ...
- Ti

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Completed Projects

- Customer Primary DW
- Traffic Primary DW
- Interconnection Traffic Primary DW (Pegaso)
- Treasury DW
- Customer Care DWH
- Marketing secondary DataWarehouse

Projects under Development

- Residential Customer Profiling DW
- Top Customer and Business Customer Profiling DW
- Secondary DW’s for DWPT (traffic)

Projects under Analysis

- Network Primary DW
- Administration Primary DW
Data Warehouse Customer Profiling

**Data:**
Consistency, Subscriptions and Customer Invoices, Claims, Credit, Operations on Traffic, Costs and Revenues

**Functions:**
Forecasting Indexes, Customer Clustering

**Feeding**
- Daily or monthly

**Sources**
- DWPC
- DWPT
- GRU

**DWHP:**
- Customer
- Traffic
- Interconnection

**Legacy:**
- Claims
- External Data

**External Data**

**Users**
- Marketing Analysts
- Sales Analysts
- Salespeople
- Campaign Managers

**On-line access for impromptu analyses**

**Claims**

**Sales**

**Marketing**

**Data Mart**

**QUERY**

**AD HOC**
Data Warehouse Customer Profiling

Reasons
- Getting *information* integrating DWPCliente and DWPTraffico *data*
- On-line data access for Business support (marketing, sales, campaigns, CC, ...)
- Further acceleration of the answer to the users
- Providing analyses based upon segmentation, clustering, ... (Data Mining)
- Supporting sales campaigns (call list and feedback extraction)
- Integrating existing data with external sources

Contents
*Customer and Traffic Integrated Data*
- Consistency, Subscriptions and Customer: latest releases
- Invoices, Credit, and Operations: synthetis data with a limited history
- Traffic: period synthetis data
Secondary DW’s for DWPT (traffic) : Typical typology of required Analyses

Monitoring the main traffic parameters (no. of conversations, duration, ...) according to the following analysis dimensions:

- **month, week, day, 1/2 hours (Time)**
- **price band**
- **duration class and distance class**
- **customers segment**
- **national/international guiding lines**
- **origin**
- **interconnection point (mobile and fixed providers) matrix (Region/Region, ....) and territories**
- **incoming/outgoing traffic per customer**
- **marketing offering**
- **customer/outgoing traffic line per corresponding telephone**
- **usage band**
Secondary DW’s for DWPT (traffic)

- Business Objectives
  - Providing on-line traffic data to analysts and decision makers
  - Manipulating Data Mining data and what-if analysis

- Approach
  - Data extraction from DWPCliente and DWPTraffico
  - Building of Multidimensional structures
  - Reporting and OLAP data exploitation via Web
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Architecture for DATA MINING

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Primary DW</th>
<th>Secondary DW</th>
<th>User</th>
</tr>
</thead>
</table>

- Validation and Knowledge
- Data Knowledge Statistics
- New reports
- Data Knowledge Statistics + MINING
Conclusions

Thanks to SAS technology, Telecom Italia is building the following Secondaries DW:

- Residential Customer Profiling DW
- Secondary DW’s for DWPT (traffic)

... and by SAS technology Telecom Italia is realizing its own Business Intelligence strategy
Data Warehousing in Telecom Italia

Company-wide Usage of a new Technology to support Business Intelligence

Since 1992, Telecom Italia has integrated his company data bases (BDA), centralizing the management and the access to these interest data for the whole company. Telecom Italia Data Management Office, has built two specific large dimension Data Warehouses, concerning the supply of services for the DM Business:

- DWHPC - Primary Customer Data Warehouse, containing measures, contracts, invoices, credits etc. about Telecom Customers.
- DWHPT - Primary Data Warehouse, containing informations about how the Customers use the Voice Services and the Data Transmission.

The Primary Data Warehouses have huge dimensions as you can realize from the following informations concerning the operational data:

- ~ 23 millions CUSTOMERS
- ~ 22 ML ACTIVE SITES
- ~ 25 ML active telephone SUBSCRIPTIONS
- ~ 25 ML CONTRACTS/TB/ISDN/FONIA
- ~ 200 thousand TD installations
- ~ 40 ML CONTRACTS for Products
- ~ 10 ML discount CONTRACTS
- All the managed phone cards
- ~ 120 ML CDR/days (DIA)
- ~ 50 ML CDR/days (Interconnection)
- ~ 300 thousand OL/days
- ~ 24 ML Customer INVOICES (NPF, TLD, IBS 3.0)
- ~ 40 millions unpaid Invoices (SIA/CR)

These two Primary Data Warehouses, filled with the company informations and organized in Large Data Base, are the technical infrastructure needed for:

- Supporting the analysis of Customers behaviour about the use of Services, products, discounts and traffic (Customer Profiling).
- Supporting the systems of Customer Relationship Marketing (new strategies of Customers management) and Business Intelligence.
- Supporting the activities of analysis, forecast and execution of simulation scenarios (DSS).
- Supporting through the Data Mining Data Warehouse the Marketing, Sales and Customer Care activities.

Telecom Italia chose SAS technology to realize the services in order to support the Business Intelligence.

Particularly, Telecom Italia planned the use of Enterprise Miner in DWHP (Primaries) and the use of data analysis systems, visualization, segmentation, statistics and reporting in DWHS (Secondaries).

The Primary Data Warehouses are for Telecom Italia the useful infrastructure to build:

- Decision Support and Business Intelligence Systems.
- Large delivery of Company informations.
- Historical trends comparisons.
- Forecasting and simulation scenarios.
- Data Mining (customers segmentation, fraud detection, etc…).
Thanks to SAS technology, Telecom Italia is building the following Secondaries DW:

- Residential Customer Customer Profiling DW
- Top Customer and Business Customer Profiling DW
- Secondary DW’s for DWPT (traffic)

**Data Warehouse Customer Profiling**

**Reasons**

- Getting *information* integrating DWPCliente and DWPTraffico *data*
- On-line data access for Business support (marketing, sales, campaigns, CC, …)
- Further acceleration of the answer to the users
- Providing analyses based upon segmentation, clustering, … (Data Mining)
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**Contents**

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**Secondary DW’s for DWPT (traffic)**

**Business Objectives**

- Monitoring the main traffic parameters (no. of conversations, duration, …)
- Providing on-line traffic data to analysts and decision makers
- Manipulating Data Mining data and what-if analysis

**Approach**

- Data extraction from DWPCliente and DWPTraffico
- Building of Multidimensional structures
- Reporting and OLAP data exploitation via Web

**Conclusions**

The Secondary Data Warehouses are assuming in Telecom Italia a fundamental role for the whole company, because they are going to allow company data exploitation as strategic assets to ensure that application development is consistent with the evolution of business requirements. SAS Institute with his technology and professionality, is helping Telecom Italia to achieve his aims, particularly important and strategic at this moment, since the company is passing from Government Monopoly to Competitive Market.