Enterprise Wide Data Warehousing with SAP BW

SAP NetWeaver Regional Implementation Group -BI
SAP AG
Content

Enterprise Wide BW - Background

- Elements of a Corporate BW Strategy
  - The BW Data Model Prevents Silos
  - BW Data Layers Guarantee Reliability and Flexibility
  - BW Corporate Landscape Patterns
Enterprise Wide BW

Background
- Continuously increasing number of BW installations
- Steady growth and coverage of BW installations
- High degree of customer-satisfaction with BW
- Broad analyst acceptance of BW and the packaged solution approach
- In general a renaissance of data warehousing

Introduce an enterprise wide BW Strategy and Guidelines that guarantees:
- Flexibility
- Reliability
at low costs

What offers BW to help you realizing an enterprise Data Warehouse Strategy?
What are the elements of an enterprise BW Strategy?
Enterprise perspective on BW:

- Higher level organizational units want to harmonize the lower level BW initiatives
- Architecture-based BW implementation from the very beginning
- Stabilize a mature BW landscape (Overhaul the architecture)
Multiple BW Implementations – Challenges

Consistency issues:
- Uncontrolled data flows
- Multiple extractions of same data
- Costly development
- Not aligned data models

⇒ Danger of ‘high level’ Silos

Successful Data Warehousing means: controlled redundancy!
Local BW Implementation – Challenges

Observations:
- Incremental set up
- Solution-Focus (Data Marts)
- Departmental view
- Project is responsible for the entire Data Warehouse Process

Potential consequences:
- Departmental islands (silos)
- Consistency problems
- Completeness not sufficient
- Flexibility restricted
- Trace back not possible

Successful Data Warehousing means: controlled redundancy!
Corporate Data Warehousing Strategy

Missing corporate strategy and guidelines

Means:
- Uncontrolled Redundancy
- Limited Solution Focus

Potential consequences:
- Silo solutions
- Doubtful reliability
- Restricted flexibility
- High costs

Prerequisites to set up a proper strategy:
- Awareness
  about accepted data warehousing concepts and their benefits
- Support of corporate management (Sponsorship)

"If there is no organizational momentum toward a common goal, then the best architecture, the best framework in the world is bound to fail."

W.H. Inmon
Who needs a Corporate BW Strategy?
All, but the prerequisites are different!

Necessity of a corporate BW Strategy

Architecture-, SAP-based, 'single Instance'

OLTP landscape
Content

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Elements of a Corporate BW Strategy

Think of: Building a ‘Corporate Information Factory’ *
- Avoid Silos

BW Enterprise Data Warehousing Decision Areas

Architecture  Application Development  Integration Strategy Support

Data Layer  Data Model  Landscape

Operational Decision-Making  Tactical/ Strategic Decision-Making

*The Corporate Information Factory: introduced by Inmon, Imhoff
The Role of a Consistent Data Warehouse Data Model

Inconsistent Data Warehouse Data Models ⇒ Island-solutions (silos, stovepipes)

Consistent Data Warehouse Data Model ⇒ long term success

A challenge for Data Warehouse consistency

Material Management OLTP
Sales OLTP
HR OLTP

Not aligned operational Data Models

Consistent corporate Data Model
The BW Data Warehouse Data Model

BW offers as part of the Business Content a predefined expandable Data Warehouse Data Model

Consistent mapping of operative data models
- For all SAP applications
- For SAP industrial solutions (e.g. Retail, Utilities..)
- For non SAP application
  - Ascential Partnership
  - Siebel, Oracle ....

BW Data Warehouse Data Model for SAP und other applications (InfoObjects & InfoSources)

SAP Corporate Data Model

Legacy Data Models
BW Extended Star Schema built on the BW Data Model

BW InfoObject Master Data: Shared/ Conformed Dimensions

BW Extended Star Schemas built on BW Data Model

BW InfoCube: scope-specific

BW Data Model defined by Business Content

BCT Extractors/ DataSources

MaterialType

Materialgroup

Sales ORG

Customer

Material

Sales Person

Sales Transaction

Corporate Data Model: SAP Components

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Conformed dimensions enable virtual BW MultiProvider scenarios

**Material Dimension:** local & conformed part

**Local** Part of Material Dimension

**Conformed, Shared** Part of Material Dimension

**InfoCube A**

**Fact Table**

**Material Dimension Table**

- Material_Dimension_ID
- SalesOrg_Dimension_ID
- Time_Dimension_ID
- Customer_Dimension_ID

**Material Master Table**

- `0MATERIAL`
- Material Type

**Material Text Table**

- `0MATERIAL`
- Language Code

**Material Hierarchy Table**

**InfoCube B**

**Fact Table**

**Material Dimension Table**

- Material_Dimension_ID
- `0MATERIAL`
- `0PROD_HIER`
The BW Data Warehouse Data Model is the glue, which ties everything together!

It protects against ‘silos’ (‘stove pipe solutions‘, ‘islands’)
- Within a BW Instance
- Within a BW Landscape

It is the basis for communication
- ‘Drill Thru’ between BW solution structures (InfoCubes, ODS-Objects)
  - within a BW Instance
  - within distributed BW Instances
- ‘Drill Thru’ between BW solution structures and SAP applications
- Between people

Enterprise BW Strategy:
- Usage of delivered BW DWH data model whenever possible
- Central controlled guidelines for modifications and expansions
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Introducing a BW Layer Architecture to Guarantee Reliability and Flexibility

SAP Business Information Warehouse and the Corporate Information Factory (CIF)*

* Source: Bill Inmon

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‘The Data Mart is customized and/or summarized data derived from the data warehouse’
The BW Data Mart Layer based on the BW Data Model and a proper Project Method offers

- Consistency within the Data Marts (InfoCubes, ODS-Objekte)
- Control of data redundancy (MultiProvider, Queries)
- All desired historical views
- ...

BW Extended Star Schema:
- InfoCubes
- InfoObject Master Data ('conformed dimensions')
It is not the task of the scope-oriented Data Mart layer to anticipate all kinds of future arising needs – this would overload the schemas and corrupt performance.

It cannot be expected that the data mart project teams have the 360° corporate view.

We are limited from a corporate perspective in terms of:
- Flexibility, Completeness
- Reliability, Consistency

if we concentrate ourselves just on Data Marts.

BW Data Warehouse Layer – the corporate layer
SAP Business Information Warehouse and the Corporate Information Factory (CIF)*

The result of the data transformation and cleansing process is stored persistently:
- Subject oriented
- Integrated
- Granular
- Non volatile (historical)
- Not scope-specific (not flavored)
The BW (Enterprise) Data Warehouse Layer
The Corporate Layer – What can we expect?

Reliability, Trace back – Prevent Silos
- ‘Single point of truth’
- All data have to pass this layer on it’s path from the source to the summarized edw-managed data marts

Controlled Extraction and Data Staging (transformation, cleansing)
- Data are extracted only once and deployed many
- Merging data that are commonly used together

Flexibility, Reusability, Completeness
- The data are not manipulated to please specific project scopes (unflavored)
- Coverage of unexpected ad hoc requirements (Support the Unknown)
- The data are not aggregated
- Old versions are not overwritten or changed but useful information may be added

Integration
- Data are integrated (as far as possible)
- Realization of the corporate data integration strategy

... 

The BW Data Warehouse Layer is the corporate memory, the corporate information repository
Introducing the BW Data Warehouse Layer

Ownership
Corporate Guidelines must be defined and administrators must be established to achieve the goals of a Data Warehouse layer

Set up
Incremental set up in parallel with data marts guarantees buy in from business users

Technology
- BW ODS-Objects
- Expanded InfoSources define ODS-Object structures
- BW flexible staging for Master Data

Web templates, Reports, Queries
Data Marts (InfoCubes)

Business Logic

(E)DW Layer (ODS-Objects)
Staging, Transformation, Cleansing

Sources

Project Team
Admin Team

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SAP Business Information Warehouse and the Corporate Information Factory (CIF)*

Data Acquisition
- Staging Area
- Cleansing
- Transform

Primary Data Management
- Data Warehouse
  - Master Reference Data
  - Transaction Data

Data Deliver
- Architectured Data Marts
  - Finance
  - Logistic

Operational Data Store

Any source

Any target

* Source: Bill Inmon
Operational, Tactical and Strategic Decision-Making in ‘Traditional’ BW Implementations

Most BW customers do not distinguish between strategic/tactical and operational decision-making using BW features:

- Precalculated aggregates of InfoCubes (aggregation awareness)
- ‘Drill thru’

- Tactical/strategic on summarized data: Data Marts
- Operational on detailed, slightly summarized data: Standard Collections

InfoCube with precalculated aggregates
Two InfoCubes with ‘Drill Thru’
InfoCube and ODS-Object with ‘Drill Thru’

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Flexibility of BW Architected Data Marts: Data Marts & Standard Collections

Focus of traditional BW implementations:

- Support the known
  - Data mart scenarios
    - InfoCubes
    - Summarized
  - Edw base tables
    - Granular
    - Complete history
    - ODS-Objects

- Support the unknown
  - Standard collections
    - Detailed, slightly summarized
    - InfoCubes, ODS-Objects

Tactical / strategic decision-making

Operational decision-making, flexibility

Flexibility & reliability
Limits of Using BW the Traditional Way: Introducing BW Operational Data Stores

The traditional usage of BW (with or without dwh-layer), which supports all kinds of decision-making using Architected Data Marts has its limits:

- If we want to provide event-level or close to event-level operational reporting (‘near real time data warehousing’) and/or
- If we are confronted with high data volumes (e.g. Retail)

Dedicated ODS-Objects (or InfoCubes) with granular data support operational decision making:

- Directly loaded from PSA
- Short life cycle of data (Archiving, Near line Storage)
- They build a BW Operational Data Store
Abstract Layer Architecture and the Reality of BW as 'Packaged Solution'

Focus of traditional BW implementations:

- **support the known**
  - edw (base tables)
    - granular
    - complete history
    - ODS-Objects
  - standard collections
    - detailed, slightly summarized
    - InfoCubes, ODS-Objects
- **support the unknown**
  - data mart scenarios
    - InfoCubes
    - summarized
- **support low latency & high volume**
  - Operational Data Stores
    - BW ods / BW PIPE for retail
    - others
    - most granular

- **tactical / strategic decision-making**
- **operational decision-making & flexibility**
- **flexibility, reliability & data mining**
- **operational decision-making & data mining**
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Enterprise Data Warehouse as ‘Single Point of Truth’

The Corporate Information Factory*

- Departmental Data Marts
  - Marketing
  - Acctg
  - Finance
  - Sales

- ETL
- Global ODS
- Local ODS
- Oper. Mart

- Staging Area
- Changed Data

- Corporate Applications
- ERP

- Cross media Storage Management
  - Near line Storage
  - Archives
  - Exploration warehouse / data mining

- DSS Applications
  - ERP
  - ERP
  - ERP
  - CRM
  - eComm.
  - Bus. Int.

- Exploration warehouse / data mining

- Session Analysis
- Web Logs

- Internet
- Preformatted dialogues
- Cookie Cognition
- Dialogue Manager

* Source: Bill Inmon

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Basic Landscape Types

The ideal corporate BW landscape that supports all kind of decision-making needs?

Select the [IT] approach that fits most closely with corporate strategy

Prof. Sethi, University of Texas Information & Management, 2/01

There is no ‘one size fits all’ BW landscape!
Some Influencers of a Corporate BW Landscape

- More and more operational, low-latency decision-making using BW
  
  **operational decision making**
  
  operational BW Objects
  
  **tactical/strategic decision making**
  
  edw & edw managed data marts

- Mission critical BW applications in BW
  
  **business critical applications**
  
  **mission critical applications**

- Local interests
  
  **local freedom**
  
  **central governance**

- Flexibility for time of migration and future acquisitions
**Single Corporate Wide BW Instance**

**Parameters**
- Company time zones
- Mission critical dominates others
- Workload from operational reporting
- Scalability

![Diagram of Single Corporate Wide BW Instance]

- **External Data Marts**
  - Mission critical
  - Business critical
  - Others

- **Latency**
  - Near real time
  - >= 1 day
Handling Mission Critical and Operative Decision-Making Separately

Parameters
- Company time zones
- Mission critical dominates EDW
- Migration path from single Instance
- EDW separated from majority of data marts

Parameters
- Company time zones
- EDW close to majority of data marts
Multiple Central Managed Local BWs to Support Business Critical Scenarios

- **Asia**
  - Local BW
    - business critical
    - others

- **Europe**
  - Local BW
    - mission critical
    - strategic

- **Americas**
  - Local BW
    - business critical
    - others

**Parameters**

- Scalable
- Mission critical dominates EDW
- EDW separated from majority of data marts
Summary

BW offers a wide range of features that support enterprise wide data warehousing needs.

Nevertheless a strategy and an organizational momentum must exist to realize an enterprise wide BW strategy.
Questions

Any Questions?
Further Information

Public Web:
www.sap.com > Solutions > SAP NetWeaver

SAPNet:
Use ALIAS: /BW

SAP Service Marketplace:

www.service.sap.com/bw
- BW InfoIndex – Data Modelling
- BW InfoIndex – Enterprise Data Warehousing
- BW InfoIndex – ODS Functions
- EDW Whitepaper:
  http://service.sap.com/~sapidb/011000358700003703852003E/Enter
  priseDWOverviewEN.pdf

www.service.sap.com/education
- PDEBW1 ‘Enterprise Wide Data Warehousing with
  SAP BW’ (Workshop - 2 days)