Banking Data Warehouse and the International Convergence of Capital Measurement and Capital Standards: A Revised Framework

BDW Version 3.4
and the
Basel II Capital Accord

Whitepaper

December 2005

Contents

About this Paper

The purpose of this paper is to outline the components of the Banking Data Warehouse (BDW) and how they assist financial institutions to address the data modeling and data consolidation issues relating to the Basel II Capital Accord.

This paper is divided into the following chapters:

Chapter 1, "**Data Integration and the Banking Data Warehouse**" summarizes the benefits of the BDW as a central data repository for the financial institution.

Chapter 2, "**BDW support for the New Basel II Accord**" summarizes the enhancements to version 3.4 and how these address the Basel II Revised Framework.

Chapter 3, "**BDW Components and the Basel II Architecture**" describes briefly an overall functional architecture for Basel II and how each of the BDW components fit into this architecture.

Chapter 4, "**Banking Data Warehouse Components**" outlines each of the BDW components.

Chapter 5, "**BDW support for Industry Directives based on Basel II**" discusses various Industry Directives and how the BDW can address their requirements.

Chapter 6, "**Customer Example**" outlines how one bank is using the BDW for its enterprise-wide Basel II solution.

Data Integration and the Banking Data Warehouse

Executive management and regulators want a coherent view of both risk and financial data

Financial institutions are facing a series of related risk and compliance challenges. These include:

- Basel II
- IFRS / IAS

The pace of change driven by the compliance challenges will be different across financial institutions. However, there is now a general recognition that the long term direction of aligning economic and regulatory capital means that risk weighted asset and economic capital calculations should eventually become a key driving force for decisions within the financial institution.

Risk weighted Asset and economic capital calculations should eventually become a key driving force for decisions within financial institutions

The long term business of a financial institution is dependant on maximising return on capital. Risk weight asset and capital calculations may be utilised to provide bespoke pricing. This allows the financial institution to determine which products should be promoted to which customers to achieve maximum return on investment and so becomes the driver for marketing and relationship management.

There is a need to align the data structures that drive risk and financial data. These are*:*

1. **Transactional data** that covers all types of transaction and links the financial results of each transaction with the risk and financial objectives of the financial institution
2. **Asset data** that covers all types of assets that might be linked to the transaction, the valuation of these assets and the correlation of asset behavior
3. **Customer data** for all counterparties which includes the credit risk of the counterparty and makes provisions when new information or circumstances changes that risk. Detailed data on customer is required to support product selection and pricing in addition to other relationship management decisions.

There are different ways to view this data – and not all are well-represented by either risk or financial systems. Executive management and regulators want coherent views. This approach requires an integrated data environment supporting the decision making and reporting requirements across the financial institution.

In an increasing competitive environment, financial institutions need a single view of their business information.

Given the connection between risk, finance and customer insight, financial institutions require an integrated data environment supporting the decision making and reporting requirements across all aspects of the business and compliance requirements.

The Banking Data Warehouse is an enterprise-wide data architecture for a consolidated view of business data

The IBM Banking Data Warehouse (BDW) is a design for such an enterprise data integration environment. BDW version 3.4 has comprehensive support for Basel II and IFRS / IAS in addition to all other areas of banking. Many financial institutions are now using BDW to support the integrated data requirements across all aspects of their business as represented below.
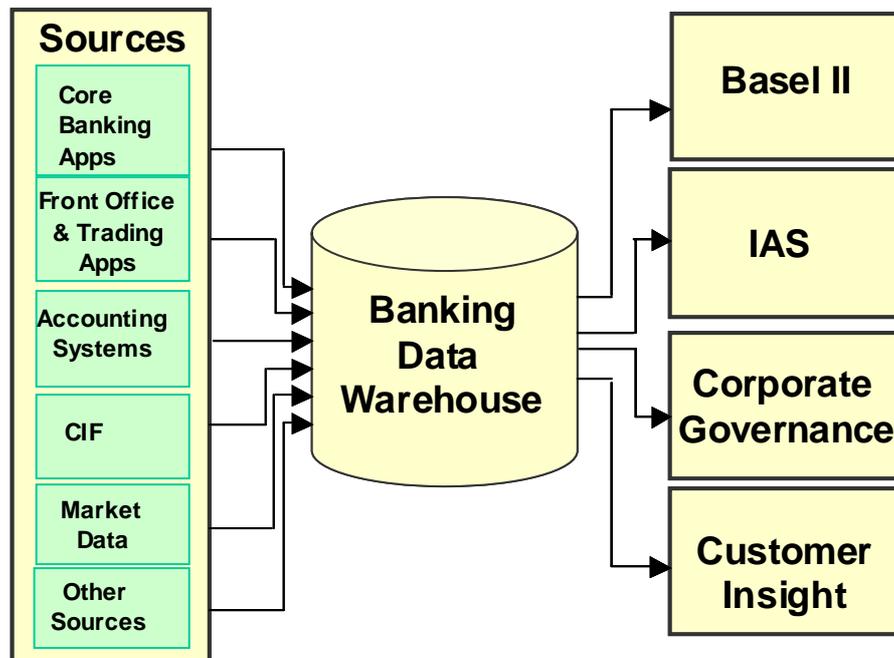
With BDW 3.4 as the underlying architecture, the financial institution can now leverage all the advantages of an integrated data hub

The benefits of using the BDW as the financial institution's data integration hub with a single consolidated view of data include:-

- o Integrated risk and compliance information
- o Increased flexibility to address new requirements
- o Faster response to new requirements
- o Ability to better leverage data across lines of business
    - o increased cross sell opportunities
    - o Increased Know Your Customer ability in customer insight and operational and credit Risk.
- o Increased consistency in data usage
- o IT cost savings due to a reuse of population, storage and reporting components

More information on the IFRS / IAS aspect of BDW may be found in the Whitepaper:-

Banking Data Warehouse Support for International Financial Reporting Standards (IFRS) including the International Accounting Standards (IAS) (BDW34035)

Additional information on BDW can be found in the **BDW General Information Manual**.

These documents may be requested by emailing 3ifwhelp@ie.ibm.com

BDW support for the New Capital Accord

IBM has been enhancing the BDW to support The New Capital Accord over a number of development releases. The main BDW development objective is to ensure that all necessary Basel II enhancements are incorporated into the BDW models. This ensures that financial institutions can take advantage of the BDW's proven data warehouse architecture while addressing their specific Basel II requirements.

BDW 3.4 is just one step of a constant evolution of best-practice data warehouse models for financial institutions

When a financial institution uses BDW to address their Basel II needs, they are building on a proven foundation that incorporates all Basel II specific requirements.

BDW will continue to evolve to incorporate future Basel II and other regulatory requirements

BDW version 3.4 is the fourth development iteration of BDW where Basel II is a major focus. BDW 3.1 included enhancements to the existing risk components to extend the support for Basel II Credit Risk. BDW 3.2 further extended the existing structures to support Credit Risk IRB Advanced based on CP3. BDW 3.3 was then enhanced to provide explicit support for Operational Risk assessment and loss information, and the final changes presented in the "Revised Framework". BDW 3.4 now includes support for the new Basel II paper on Counterparty Credit Risk, Double Default and Maturity Adjustments for trading related activities impacting the banking book.

The BDW provides both the structures for the central data warehouse as well as the means to understand the reporting implications as defined in Basel II Pillar 3 Market Discipline

The BDW Model has complete atomic level structures in place to address Credit and Operational Risk approaches specified in the Basel II Revised Framework and additional structures to support Market Risk. As well as providing the necessary atomic data structures, the BDW Model has significant support for the aggregations required by Basel II in the Summary Area of the model.

The Business Solution Templates and associated BDW Project Views provide support for Pillar 3 Market disclosure requirements for Capital Structure and Capital Adequacy, Credit Risk including Risk

The Application Solution Templates identify the data requirements, as defined in Pillar 1, for the calculation of the risk components for the Advanced approaches to Credit and Operational Risk. Every module has a mapping back into the data warehouse to identify the source of information for use by credit risk engines or calculators.

BDW is selected as the Basel II data warehouse platform by many existing and new BDW customers

The BDW has already been proven successful on customer Basel II projects. A significant number of financial institutions are using BDW to address the data requirements of the Basel II Accord. This usage has validated the IBM approach and BDW content.

Non-Basel II Financial Institutions

The Risk Data Collection and Risk Reporting capabilities of BDW are also applicable outside of a Basel II context

The changes in BDW 3.4 are not just of interest to financial institutions in countries that are required to implement Basel II, but to any organization that wants to improve the capability of their risk management systems.

Financial institutions using BDW are building on a best of breed foundation that addresses risk and compliance requirements using IBM's market leading research and technology based on a principle of open architecture.

Banking Data Warehouse Components

The Banking Data Warehouse (BDW) is a proven, stable foundation for a Basel II data warehouse

The IBM Banking Data Warehouse (BDW) enables financial institutions to build data warehouse solutions to suit their specific needs. BDW has the flexibility to enable the creation of a range of data warehouse solutions from departmental data marts to enterprise-wide data warehouses.

The BDW comprises a proven, flexible and scalable data warehouse technical infrastructure to address the following business reporting and analysis needs:

The full range of typical business issues are already encapsulated within the BDW

- Profitability
- Relationship Marketing (CRM)
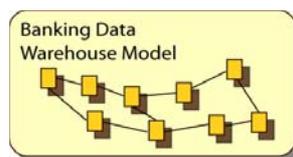- Regulatory Compliance
- Risk
- Asset and Liability Management

The IBM BDW content models are the cornerstone components of a financial institution's customized development of a data warehouse and business intelligence environment. This BDW environment may be integrated with the bank's existing data mart or business information warehouse reporting environments.

Data from all across the financial institution can be consolidated into the BDW

BDW supports the data requirements of Basel II and has been implemented for this purpose by many Financial Institutions. BDW provides comprehensive data coverage for both retail and wholesale banking. It may be integrated with other Basel II applications to provide a complete solution to both the Basel II data storage and reporting requirements.

The models and the benefits that they provide are listed in greater detail in the remainder of this document.

Banking Data Warehouse Model

The BDW Model is an entity relationship data model that provides the historical and atomic data needed for a data warehouse. It is a business intelligence infrastructure supporting multiple lines of business and analytical functions within medium to large financial institutions. The aim of this shared infrastructure is to provide a data integration hub that will reduce the development and operational costs in providing business intelligence functionality to the myriad of front and back office organization units. This is made possible by sourcing the data once into a data integration hub, and then reusing business intelligence development and operational skills and assets. The organization can then focus on managing the implementation of consistency of definition, transformation, and distribution of the data used for business intelligence across the lines of business.

The BDW Model provides a well architected set of data structures for both data consolidation and data reporting

IBM provides a default physical database design, generated from the logical entity relationship data model. This physical data model incorporates IBM's vast experience in implementing data warehouse databases for the financial services sector, and could be implemented as is, to show how a data warehouse database should work. It is more likely though, that it will be customized further by a data warehouse design team of experts comprised of senior warehouse architects and database administrators, so as to ensure optimal configuration for the financial institution's data distribution and performance characteristics.

Any data and business requirements of the financial institution can be customized into the BDW

The BDW Model now contains the data structures needed by a financial institution to support the approaches for Credit Risk, Operational Risk, as well as the data structures needed to support Market Risk as defined in the Basel II Revised Framework.

Risk data and disclosure requirements as defined in the Basel II documentation are now covered by BDW

Many of the Basel II changes in BDW Version 3.4 have been focussed on extensions to support the Counterparty Credit Risk, Double Default and Maturity Adjustments of trading related activities.

The enhancements to BDW 3.4 for Basel II are predominantly to support the new document "The Application of Basel II to Trading Activities and the Treatment of Double Default Effects, July 2005 (document bcbs116). These BDW 3.4 enhancements include:

- o Enhancements to support the Counterparty Credit Risk (CCR) –
  - o New entities & attributes to model the approach to CCR – Current Exposure Method (CEM), Standardized Method (SM), Internal Model Method (IMM), Specific Risk Category, Hedging Categories and Netting Snapshots, Risk Positions, Arrangement Leg data and updates to existing Credit Derivative Snapshots, Financial Instruments and Netting Agreement Summary including notional amounts, exposure amounts and capital charges.
- o Enhancements to support the Double Default –
  - o Additional BDWM attributes to store new Protection Provider Approach type and capital requirement and risk weighted asset amounts
- o Enhancements to support changes in Maturity Adjustment -
  - o Update and extension of existing Maturity AST modules to include new references and requirements for short-term exposures

Business Solution Templates

The BDW contains the Business Solution Templates (BSTs), reflecting the most common types of query and analysis for specific business areas that most users need to perform. The BDW also supports other data requirements such as reporting, data mining and decision support.

The BSTs are set of reusable sample dimensions and measures specifically designed for financial institutions

The BSTs have three main components:

- 1780+ reusable financial measures
- 380+ reusable financial dimensions
- 81 groupings of the above measures and dimensions into configurable Business Solution Templates.

Business Solution Templates with BDW 3.4

Relationship Marketing	•Customer Interaction Analysis •Customer Investment Profile •Individual Customer Profile •Wallet Share Analysis	•Customer Complaints •Delinquency Analysis •Customer Loyalty •Market Analysis	•Campaign Analysis •Cross Sell Analysis •Customer Attrition •Customer Behavior •Lead Analysis
Profitability	•Transaction Analysis •Activity Based Costing Analysis •Insurance Product Analysis •Investment Arrangement Analysis	•Profitability Analysis •Channel Profitability •Customer Lifetime Value •Customer Profitability •Location Profitability	•Product Profitability •Product Analysis •Organization Unit Profitability •Performance Measurement •Business Procedure Performance
Risk	•Interest Rate Risk Analysis •Credit Risk Profile •Credit Risk Assessment •Credit Risk Mitigation Assessment •Securitization Analysis •Operational Risk Assessment	•Outstandings Analysis •Portfolio Credit Exposure •Security Analysis •Liquidity Risk •Collections Analysis •Insurance Risk Profile	•Authority Profiling •Credit Risk Analysis •Debt Restructuring •Involved Party Exposure •Location Exposure •Non Performing Loan •Operational Risk Loss Analysis
Asset & Liability Management	•Interest Rate Sensitivity •Liquidity Analysis •Short Term Funding Management •Financial Management Accounting	•Capital Allocation Analysis •Capital Procurement •Credit Loss Provision •Funds Maturity Analysis •Income Analysis	•Net Interest Margin Variance •Structured Finance Analysis •Equity Position Exposure •Position Valuation Analysis
Compliance	•European Central Bank Reporting •Financial Capital Adequacy Analysis •Structure Of Regulatory Capital •Foreign Financial Account Analysis •Suspicious Activity Analysis •Transaction Activity Analysis •SOX Balance Sheet Analysis •SOX Cash Flow Analysis •SOX Statement Of Change In Shareholders' Equity Analysis •SOX Statement Of Income Analysis	▪Balance Sheet Portfolio Basis Approach Analysis ▪Balance Sheet Classified Approach Analysis ▪Balance Sheet Order Of Liquidity Approach Analysis ▪Balance Sheet Net Assets Approach Analysis ▪Cash Flow Direct Analysis ▪Cash Flow Indirect Analysis	▪Cash Flow Direct Financial Institution Analysis ▪Cash Flow Indirect Financial Institution Analysis ▪Income Statement By Function Analysis ▪Income Statement By Nature Analysis ▪Income Statement Financial Institution Approach Analysis ▪Statement Of Changes In Equity Analysis

Supports objectives to achieve conformity of measures and dimensions across the financial institution

Measures include, for example, the key performance indicators (KPIs) for a financial institution e.g. Number of Customers, Total Amount Of Funds Under Management, Number Of Transactions. Each measure is fully defined and may be used either in its own right, or as a component contributing to a formula, which itself may contribute to larger formulae. Where the measure is used in a formula, it is provided with a context sensitive calculation attribution e.g. in one formula, the measure may be summed into the total, whereas in another, it may need to be subtracted from the total. This reuse of measures ensures conformity of business measure use across the organization and is a key aid in the metadata management activities of a business intelligence environment within an organization.

The BSTs have been updated to provide structures to address the latest Basel II Revised Framework reporting requirements

During the analysis of the Reporting requirements, the BSTs can be used to accelerate discussions with business users to provide rapidly prototypes of specific sample reports

Measures only become useful when they are compared against each other under different headings. For example, Total Deposits compared over the last twelve monthly periods, Number of Customers within each of several geographical regions. The BST dimensions provide the headings under which measures may be broken down and compared. Over 380 industry standard dimensions are supplied, with the members fully defined. As with the measures, calculation contribution attributions are provided to show how measures are aggregated along the dimension. Dimensions are reused in several BSTs, thereby enforcing conformity of dimensions used in different analysis areas. This enables uniformity of reporting and the ability to cross reference measures from different areas of analysis; e.g. comparing profitability to risk measures across the same geographical and temporal breakdowns.

A BST is a pre-grouping of measures and dimensions taken from the available pools, that capture an analytical need in a given business area; e.g. Security Analysis, Involved Party Exposure, Customer Profitability, Credit Risk Assessment. The supplied set of templates may be fully customized and/or new templates created in order to exactly reflect the needs of a particular financial institution. New measures and dimensions may also be added to their respective pools and incorporated into templates.

The BSTs provide the underlying reporting structures for Basel II Pillar 3 Market Discipline as defined in the Revised Framework documentation and new extended Table 6 Credit Risk disclosures for Counterparty Credit Risk.

The table below shows the coverage across the three Basel II pillars provided by the relevant BDW 3.4 Business Solution Templates.

Risk management Category		Solution Name	Pillar 1			Pillar 2					Pillar 3	
			C1	M1	O1	B2	C2	R2	M2	I2	C3	R3
Credit Risk	Risk	Security Analysis	✓			✓		✓	✓	✓		✓
	Risk	Collections Analysis	✓			✓		✓	✓	✓		✓
	Risk	Non Performing Loan Analysis	✓			✓		✓	✓	✓		✓
	Risk	Outstandings Analysis	✓			✓		✓	✓	✓		✓
	Risk	Location Exposure	✓		✓	✓		✓	✓	✓		✓
	Risk	Credit Risk Analysis	✓			✓		✓	✓	✓		✓
	Risk	Credit Risk Assessment	✓			✓		✓	✓	✓		✓
	Risk	Credit Risk Mitigation Assessment	✓			✓		✓	✓	✓		✓
	Risk	Involved Party Exposure	✓		✓	✓		✓	✓	✓		✓
	A&L	Credit Loss Allowance Analysis	✓			✓		✓	✓	✓		✓
	A&L	Structured Finance Analysis	✓			✓		✓	✓	✓		✓
	Risk	Portfolio Credit Exposure	✓			✓		✓	✓	✓		✓
	Risk	Insurance Risk Profile	✓		✓	✓		✓	✓	✓		✓
	Risk	Customer Credit Risk Profile	✓			✓		✓	✓	✓		✓
	Risk	Liquidity Risk Analysis	✓			✓		✓	✓	✓		✓
	Risk	Securitisation Analysis	✓			✓		✓	✓	✓		✓
Interest Rate Risk	Risk	Interest Rate Risk Analysis		✓		✓		✓	✓	✓		✓
	A&L	Interest Rate Sensitivity Analysis		✓		✓		✓	✓	✓		✓
Operational Risk	Risk	Operational Risk Assessment			✓	✓		✓	✓	✓		
	Risk	Operational Risk Loss Analysis			✓	✓		✓	✓	✓		
	Rel	Customer Complaints Analysis			✓	✓		✓	✓	✓		
	Rel	Market Analysis			✓	✓		✓	✓	✓		
	Comp	Suspicious Activity Analysis			✓	✓		✓	✓	✓		
	Comp	Transaction Activity Analysis			✓	✓		✓	✓	✓		
	A&L	Income Analysis			✓	✓		✓	✓	✓		
	Prft	Product Analysis			✓	✓		✓	✓	✓		
	Risk	Authority Profiling Analysis			✓	✓		✓	✓	✓		
Market Risk	A&L	Equity Position Exposure		✓		✓		✓	✓	✓		✓
	A&L	Position Valuation Analysis		✓		✓		✓	✓	✓		✓
Structure Of Capital	A&L	Capital Allocation Analysis				✓			✓	✓		
	Comp	Financial Capital Adequacy Analysis	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Comp	Structure Of Regulatory Capital Analysis				✓	✓		✓	✓	✓	
	A&L	Financial management Accounting				✓			✓	✓		
	Prft	Business Procedure Performance msrmnt				✓		✓	✓	✓		✓

Legend

Pillar 1		Pillar 2		Pillar 3	
C1	Credit Risk	B2	Board & Management Oversight	C3	Capital
M1	Market Risk	C2	Sound Capital Assessment	R3	Risk Exposure & Assessment
O1	Operational Risk	R2	Risk Assessment		
		M2	Monitoring & Reporting		
		I2	Internal Control Review		

Application Solution Templates

The Application Solution Templates provide good initial scoping of what data is required to address the Basel II risk components
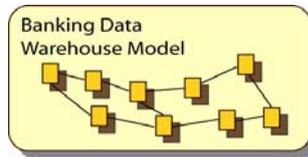
The Application Solution Templates (ASTs) are designed to show how the data contents of the Basel II risk components overlay on the BDW Model. While the BSTs are concerned with showing how reporting functions relate to the BDW Model, the AST are concerned with showing how non-reporting risk components relate to the BDW Model.

There is an AST for each specific risk component as defined in the Basel II documentation. The list of ASTs include:

- o   Credit Risk - Standardized Approach
- o   Credit Risk - Internal Ratings Based (IRB)
- o   Probability of Default (PD)
- o   Loss Given Default (LGD)
- o   Exposure At Default (EAD)
- o   Effective Maturity (M)
- o   Expected Loss (EL) And Provisions
- o   Securitization Framework
- o   Operational Risk

Each AST gives a complete breakdown of the data requirements of each risk component, as it is defined in the Basel Revised Framework documentation and recent paper on The Application of Basel II to Trading Activities and the Treatment of Double Default Effects. In addition there are detailed mappings from each AST member to the equivalent BDW Model entities and attributes.

ASTs enable a financial institution to start scoping and designing a Basel II data warehouse now

The ASTs assist a financial institution in their analysis as to what are the overall requirements of each risk component for their specific needs. Once this analysis is complete, the financial institution will then map these risk requirements back to the BDW Model and identify the data warehouse subset needed to drive their Basel II risk calculation needs.

BDW Project Views

The BDW Project Views provide a filtered view across the data mart and data warehouse structures for specific Basel II reporting requirements
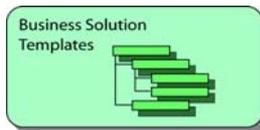
The BDW Project Views are a series of business subject area views which span across all BDW components. The BDW Project Views give users of the BDW a very clear understanding of the data coverage required in the Business Solution Templates for specific business requirements or in the Application Solution Templates for specific data calculation input requirements. BDW 3.4 includes an extensive set of Project Views specific to Basel II. These Basel II Project Views address the specific Pillar 3 requirements as well as covering other reporting requirements implied in the Pillar 1 and Pillar 2 documentation of the Basel II Revised Framework.

Each project view is anchored on a particular BST or AST, but only selects the subset of elements specifically needed to address the particular Basel II data or reporting requirement. The scope of each BDW Project View can then be extended to include the relevant pre-defined mappings that exist between the BST, AST and the BDWM Models.

The Basel II views in BDW 3.4 are shown below.

Views supporting Pillar 1

Basel II P1 CCR Current Exposure Method CEM
Basel II P1 CCR Internal Model Method IMM
Basel II P1 CCR Standardized Method SM
Basel II P1 Counterparty Credit Risk
Basel II P1 Effective Maturity
Basel II P1 Expected Loss & Provisions
Basel II P1 Exposure At Default
Basel II P1 IRB Credit Risk
Basel II P1 Loss Given Default
Basel II P1 Operational Risk
Basel II P1 Probability Of Default
Basel II P1 Securitization Framework
Basel II P1 Short-Term MA In IRB Approach
Basel II P1 Standardized Cntprty Risk Weights
Basel II P1 Standardized Risk Weighted Assets
Basel II P1 Treatment Of Double Default

Basel II Pillar 1 (P1) AST Items

Views support Pillar 2

Basel II P2 Collateral Management
Basel II P2 Credit Loss Allowance Analysis
Basel II P2 Economic Capital Allocation
Basel II P2 Involved Party Exposure
Basel II P2 Location Exposure
Basel II P2 Non Performing Loan Analysis
Basel II P2 Operational Risk Assessment
Basel II P2 Operational Risk Loss Analysis
Basel II P2 Outstandings Analysis
Basel II P2 Portfolio Exposure
Basel II P2 Revolving Credit Facility Scrtzn

Basel II Pillar 2 (P2) BST Items

Views supporting Pillar 3

Basel II P3 T 1 Scope Of The Application
Basel II P3 T 2 Capital Structure
Basel II P3 T 3 Capital Adequacy
Basel II P3 T 4 Allowance for Credit Losses
Basel II P3 T 4 By Sector Or Counterparty Type
Basel II P3 T 4 Credit Risk Exposure Detail
Basel II P3 T 4 Geographic Breakdown
Basel II P3 T 4 Impaired Loan & Allowance
Basel II P3 T 4 Maturity Breakdown
Basel II P3 T 5 Credit Risk Portfolio IRB
Basel II P3 T 5 Credit Risk Portfolio STD
Basel II P3 T 6 Counterparty Credit Risk
Basel II P3 T 6 Credit Risk IRB
Basel II P3 T 6 Credit Risk IRB Equity
Basel II P3 T 6 Credit Risk IRB Retail
Basel II P3 T 6 Credit Risk Losses IRB
Basel II P3 T 6 Credit Risk Losses IRB Advanced
Basel II P3 T 7 Credit Risk Mitigation
Basel II P3 T 8 Securitization Disclosure
Basel II P3 T 8 Securitization Early Amrtztn
Basel II P3 T 9 Capital Adequacy Disclosure STD
Basel II P3 T10 Capital Adequacy Disclosure IMA
Basel II P3 T11 Operational Risk Basic
Basel II P3 T11 Operational Risk Standardized
Basel II P3 T12 Equity Disclosure Banking Book
Basel II P3 T13 Interest Rate Risk Banking Book

Basel II Pillar 3 (P3) BST Items

BDW Components and the Basel II Architecture

BDW provides a set of integrated models to address all aspects of a data warehouse structure for Basel II

The BDW components work together as a set of complementary content models that are aimed at solving distinct management information business requirement and data architectural issues. The separate model components are delivered within an architectural structure known as the Information FrameWork. Within the Information FrameWork, elements of a model in one cell are mapped to corresponding elements in other cells; e.g. a data mart base measure may be mapped to a BDW Model attribute that is the source for the data to be loaded into the data mart. This maps the information required by a business user (measure) to the data storage maintained by a technical user (database attribute). By pre-solving problems such as these, the financial institution is left free to concentrate on the real management information and business intelligence issues:

- sourcing the data
- defining how it should be transformed and aggregated
- improving data quality management within the organization

The IBM Basel II architecture provides a complete framework for all Basel II projects

The figure below shows a standard Basel II architecture as defined by IBM.

This architecture outlines the six tiers of functionality needed to support Basel II

- o Data Sources – the internal and external sources of all data required for Basel II
- o Extraction – the processes and technology needed to extract the data from the potentially diverse sources in an efficient and timely manner
- o Enterprise Data Store – the repository into which all the detailed data needed for Basel II is gathered

A data warehouse or Basel II data store is seen as the consolidation point for all the necessary data as it is extracted from potentially many different sources

- o Transformation and Calculation – the carrying out of various calculations by specialist risk applications
- o Data Marts –aggregated data for reporting and analysis
- o Reporting – the creation and delivery of the Basel II reports to the various user groups
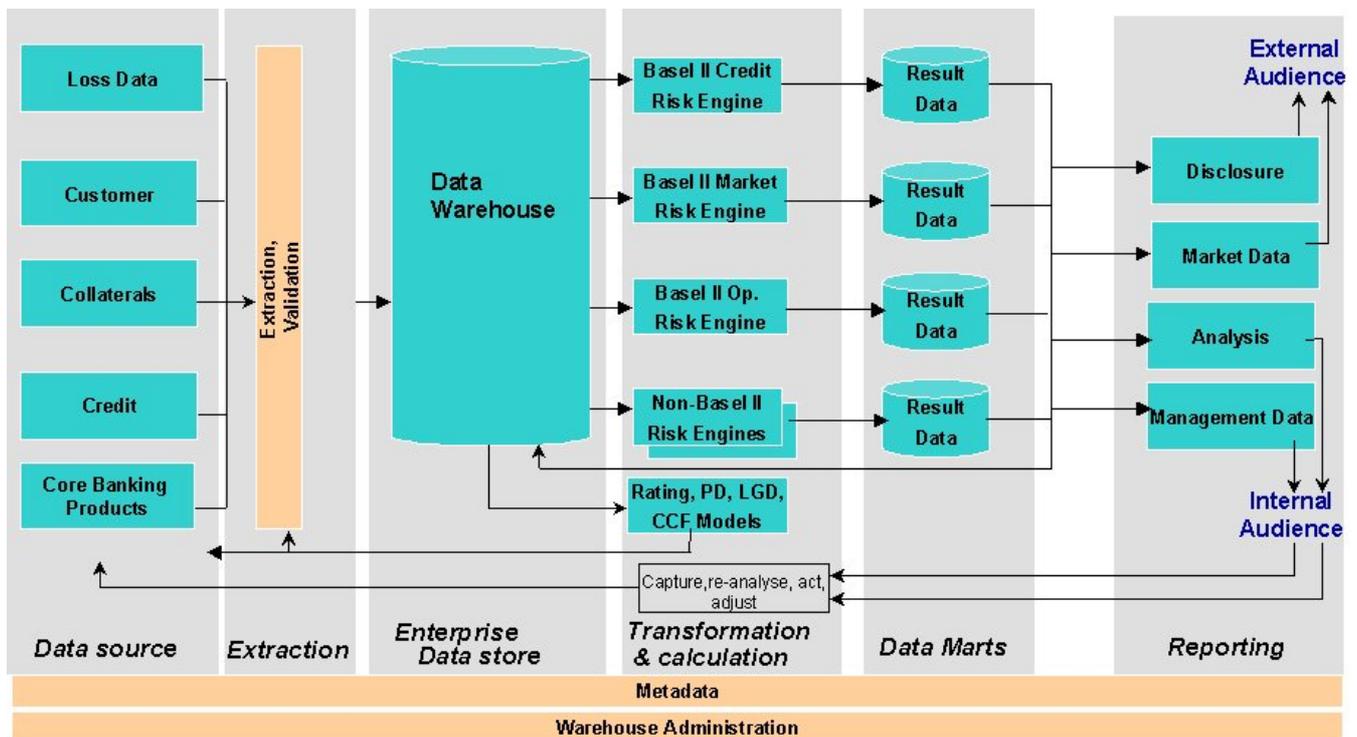
The BDW components are designed to provide a financial institution with the means of building the most extensible and effective Basel II data structures

Overlaid on this Basel II architecture are the BDW Components described in this document.

- o The BDW Model provides the design for the enterprise data store
- o The Business Solution Templates provide the foundation for the reporting and analysis requirements of Basel II
- o The Application Solution Templates describe the required data structures for the credit risk components
- o The BDW Project Views provide a filtered view across the BDW. Each view addresses specific Basel II requirements as defined in the Revised Framework
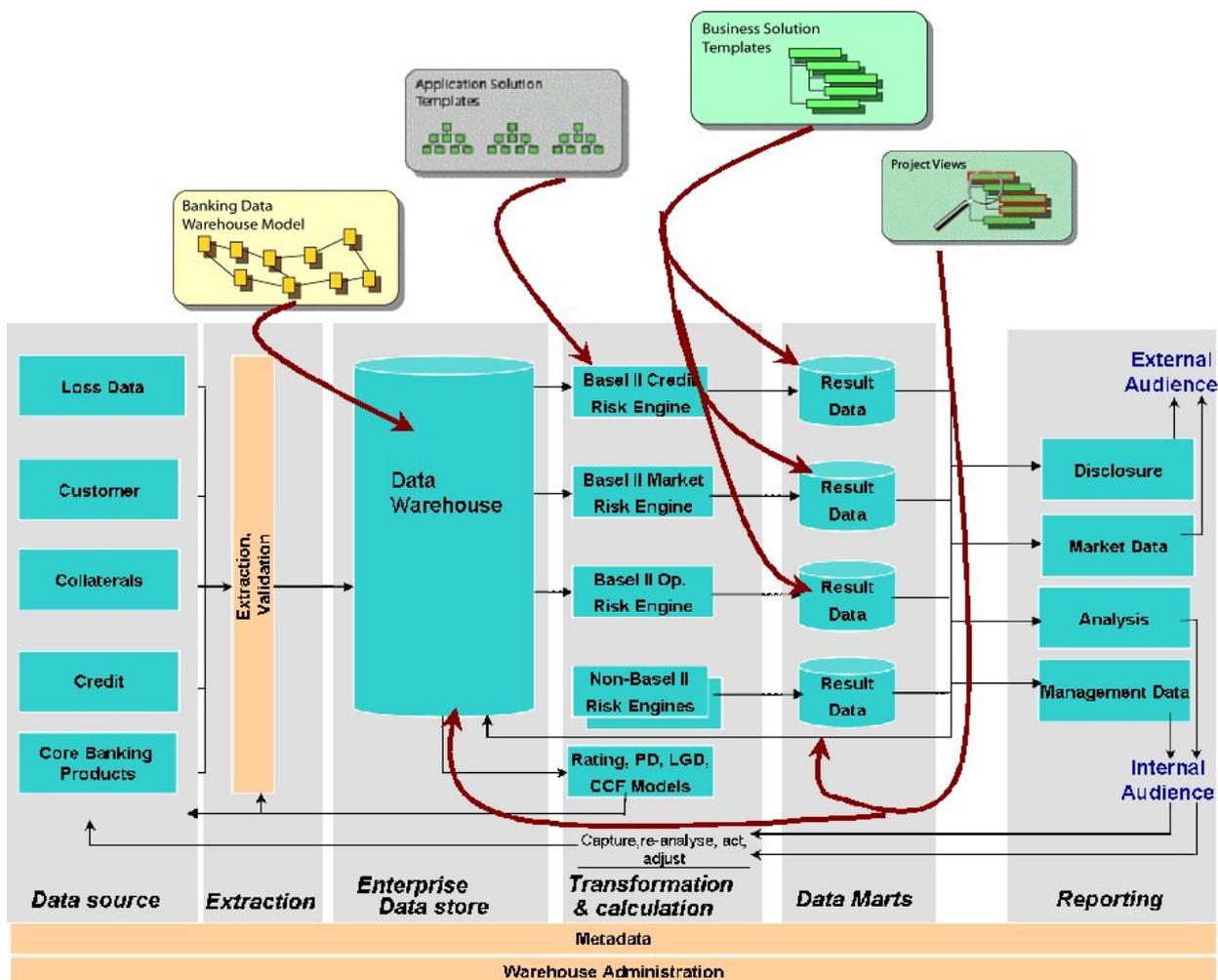
BDW support for International Directives based on Basel II

As Basel II defines an international capital adequacy framework, the regulatory authorities in each jurisdiction are interpreting and specializing those Basel II rules for their own market and to enhance their existing capital adequacy frameworks.

As part of the BDW 3.4 development cycle, some of these major directives were reviewed and a brief discussion and example of detail on each is included below.

While this section focuses on the directives in some of the major jurisdictions, BDW has been designed to support the general requirements of Basel II and therefore the requirements of other jurisdiction directives will also be met.

Basel II provides the core guidelines for many international capital adequacy directives

Capital Adequacy Directive, CAD-3

The European Commission is the executive of the European Union. Alongside the European Parliament, the Council of the European Union, it is one of the three main institutions governing the Union. One of its primary roles is to propose and implement legislation for the EU.

The European Commission has proposed a new Capital Adequacy Directive (CAD3) to revise the existing capital adequacy and consolidated banking directive legislation in the EU. CAD3 intends to amend the existing rules and to extend the scope of the new Basel regime to all credit institutions and investment firms in the EU. The BDWM 3.4 and BST 3.4 models have extensive support for the new data requirements of the proposed CAD3 capital requirements framework as they are closely aligned with the data requirements defined in Basel II. The BDWM offers extensive support for the capture of information such as the Capital Requirements, Risk Weighted Asset and Exposure details including parameters for Probability Of Default (PD), Maturity (M), Exposure At Default (EAD), Loss Given Default (LGD) and Expected Loss (EL) calculations. Also covered are the approaches to Credit, Operational, Securitization and Equity Risk, Financial Instruments, Counterparty details, Credit Risk Mitigation (CRM) Techniques and Eligible Collateral, Rating Agencies, External, Internal & Inferred Ratings, Risk Scores, Risk Weights, Account Status, Portfolios, Securitizations, and Operational Risk information including business lines, event types, gross exposure amounts, write-offs and recoveries, assessment information and loss information.

CAD3 also has specific data requirements such as those for the effects of recognition for Netting Agreements, e.g. PCEred, PCEgross, Net-To-Gross Ratio. Or throughout the Annexes, specific elements such as the Assumed Interest Rate Change, Carry Rates, Credit Quality Assessment Scale, Commodities Risk Approach Type, Institution Risk Weight Approaches, Yield to Maturity, Credit Quality Step. Although elements like these are not explicitly supported in the BDWM summaries, these values can be easily captured in the flexible BDWM Accounting Unit and Classification structures.

Although the CAD3 disclosures requirements are not tabularized as in Pillar 3 of Basel II, the 16 sections broadly corresponding to the disclosure topics covered by Pillar 3. The BST model has extensive support for reporting items including capital requirement details, exposure amounts, past due, grandfathering, charges, adjustments, provisions, write-offs and recoveries, VaR, gain on sale, CRM techniques, etc.

The CEBS advises the European Commission on banking policy issues and promotes convergence of supervisory practice across the European Union.

The CEBS Common Reporting Framework (CP04 Templates) and the COREP-Taxonomy

The forthcoming Capital Requirements Directive (CRD) will create a new reporting requirement on institutions in Europe. This is further complicated for those institutions operating on a cross-border basis as they are currently providing their supervisory reports in different national formats and using different technologies. The Committee of European Banking Supervisors (CEBS) undertook the task of achieving a common reporting framework that would substantially reduce an institution's compliance burden and the supervisory review process.

CEBS assisted by a working group that included the EU banking supervisors, has provided a COmmon REPorting (COREP) framework for credit institutions and investment firms under the future EU capital requirements regime. The Framework is primarily focused on the Pillar I requirements and its scope has been limited to Basel II/CRD regulatory own funds, credit risk, operational risk and market risk (VaR model). The framework also takes into

COREP is the Common REPorting Framework which provides common templates for the reporting of capital requirement and risk information

account the computation of the new ratio with the appropriate filters between IAS (International Accounting Standards) accounting figures and regulatory own funds.

COREP is designed to support a common and consistent approach to reporting but with the flexibility to allow for various national requirements and supervisory practices. The framework provides a set of templates, each of which contains a set of dimensions and measures which combine to provide a specific reporting requirement. The Basel II templates provide for the disclosure of Pillar 1 risk elements for the Standardized Approach to Credit Risk, Internal Ratings Based Approaches {Foundation & Advanced}, separate disclosure of Securitizations, Specialized Lending exposures, Equities, Credit Risk Mitigation techniques including redistribution effects, Market Risk and Operational Risk losses. There is also a group of generic templates to standardize relevant information as may be requested by the supervisors to complete their final scope of application for Basel II Pillar 1 e.g. distribution of risks & own funds for consolidated subgroups, open operational risk gross losses, originator securitization position.

COREP-Taxonomy is the XBRL definition of the COREP templates

An ad hoc task force mandated by the COREP group of the CEBS has created an XBRL representation of the CEBS Common Reporting Framework (COREP). XBRL is an XML standard for the exchange of business information. This taxonomy therefore documents an XBRL-based exchange of the data defined in the COREP templates, between regulated entities to their supervisors.

For the COREP templates the BDWM and BST models offer explicit support for those elements defined in Pillar 1 of Basel II and which are also required for Market Discipline disclosures as per Pillar 3. These items include details such as the Financial Institution Group Structure, Credit Risk & Operational Risk Approaches including Equity and Securitization Approaches. Risk Weights, Exposure Types, Asset Classes, Materiality Thresholds, Risk Weighted Assets, PD, EAD, LGD, EL, M, Exposure Weighted Averages, Recovery Amounts, Haircuts, Volatility Adjusted Amounts,

CRM Techniques, Business Lines, Gross Losses, Event Types, etc. The definition of the Taxonomy is supported in the BDWM Taxonomy Document entity.

The CP04 templates contain items from Pillar 1 that are not specifically required for Pillar 3 disclosures and so these items will not appear in the BSTs but are explicitly supported in the BDWM. These items include details such as Credit Conversion Factors, Securitization First Loss Positions, Maturity Mismatches, Equity Holding Period, Loans and Advances, Counterparty details, etc.

As the CP04 templates are design for European Institutions and focusing on the directives of the CRD and IFRS, they contain elements not specifically listed in the Pillar 1 of Basel II. Likewise, there are reporting requirements that may be derived from other data within the BDWM or elements (such as BII constants) that would not necessarily be stored in the warehouse. These elements do not explicitly appear in the BDWM or BST but can however be supported through the generic and flexible accounting structures within the BDWM. Examples of such elements and derivable elements include the number of obligors, single largest loss event, Funded/Unfunded Credit Protection, Exposure value affected by the minimum PD/LGD limit, confidence Levels, AMA due to an Allocation Mechanism, confidence levels, BIS floors, supervisory parameters, Adjustments to the effects of IAS-Type valuation rules on Eligible Reserves, IAS Related Adjustments to the Exposure Value, Outflows/ Inflows, etc.

The agencies proposing the ANPR in the US are the Office of the Comptroller of the Currency (OCC), the Board of Governors of the Federal Reserve System (Board), the Federal Deposit Insurance Corporation (FDIC), and the Office of Thrift Supervision (OTS)

The Advanced Notice of Proposed Rulemaking (ANPR)

In the United States, the regulatory agencies have published two documents that provide a draft supervisory guidance for implementing proposed revisions to the risk-based capital standards in the United States. These

documents describe the requirements of an acceptable risk framework for organizations adopting the Advanced IRB Approach for corporate credit risk and the Advanced Measurement Approach for operational risk.

As the ANPR focuses on the data requirements defined in Pillar 1 of the New Basel Accord, the Banking Data Warehouse has the explicit structures in place to cover the majority of the ANPR requirements. For example, the BDW has the structures for the definition of risk information such as default exposures, drivers of default, exposure types, borrower characteristics, risk portfolios, risk segmentation, risk calculations, etc. The historic data in the BDW over time will build up to compliment the FI's quality of reference data. For those elements specific to or customized by the APNR, the flexible Accounting Unit and Classification structures of the BDWM can be used to store this data. The Accounting Unit and Classification structures provide for a flexible modeling technique that can accommodate the capture of data relating to any value of interest to the banking institution e.g. an LGD Adjustment. Through the relationship constructs with other BDW entities, these values can be captured at the pool (segment) or portfolio level, at the borrower, loan or organization unit level.

The regulator capture of information in the data warehouse will build up over time to compliment the FI's quality of reference data

Operational risk is still a developing area of risk measurement, however information such as the types of mitigant, reserving & budgeting as EL offsets, Indirect costs, established risk thresholds are easily captured within the BDW warehouse implicitly through structures such as the Accounting Unit. Through the BDW Associatives, these values are then related with the various organizations, segments, portfolios, lines of business, risk categories, events, products, geographic locations, etc. within the financial institution. The BDW also provides for multiple relationship types so it is possible to map an FI's event types to the BII categories independent of how the FI categories those risks in its source system.

The BDWM has the structures to capture Operational Risk loss and assessment information by business line, risk category, event type, location across the financial institution

The BDW also provides the structures to support the data inputs to risk assessment including audit scores, risk indicators, etc. and to support the suggestion of quarterly managerial reports, summarizing risk exposures and operational loss experiences.

The disclosure requirements discussed in the ANPR are as per the CP3 release of Basel II of which the quantitative disclosures have been supported in BDW since the 3.2 release. Qualitative disclosures of Pillar 3 specifically related to data elements are supported directly from the BDW 3.4 model.

BDWM has the explicit structures to support all data requirements as defined in Basel II and the implicit structures to model generic & specialised requirements for each of the international directives

In summary, BSTs 3.4 specifically supports the quantitative items referred to in Pillar 3 of Basel II and can be easily extended with any additional reporting requirements off the underlying BDWM data warehouse. The BDWM 3.4 can support all the Pillar 1 and Pillar 3 data items which are the majority of core elements referenced in each of the new international directives. Where an international directive has specific requirements beyond the scope of Basel II, the BDWM can provide implicit support through its flexible accounting & classification structures.

The BDW AST 3.4 model provides an excellent mechanism for relating risk data requirements to the BDWM.

Customer Example

Client Name: Standard Chartered Bank

Project Name: Wholesale Bank Basel II Credit Risk Project

Project Description: Standard Chartered Bank (SCB), in line with the rest of the global banking community, has a need to meet new Basel II Capital Accord guidelines by the end of 2007. As a large UK FSA regulated bank, SCB expects to utilize the new internal modeling approaches for capital calculations - and is expected to support these with strong risk management analytics, processes and disclosure. Information and data management is a particular challenge for global banks like SCB, with SCB having operations, customers and supporting technology in more than 50 countries.

The BDW is the basis for the enterprise-wide Basel II architecture of Standard Chartered Bank

Response: IBM is combining business knowledge and practical Basel II implementation experience - in combination with leading-edge intellectual capital - in working with SCB to deliver for its Wholesale Bank a centralized Basel II supporting Information Management solution. Intellectual capital developed and being utilized includes our Banking Data Warehouse (BDW) model, a proven data management solution, which has been significantly enriched over the last 18 months to support Basel II.

Results: In addition to serving Basel II compliance needs - the solution will, over time, be utilized by other stakeholders across the Wholesale Bank (including Group Risk Management, Finance and Special Asset Management teams) - and be relied upon as a source of reliable information for management and regulatory reporting, portfolio management and front-line business users across the Wholesale Bank.

The BDW based solution addresses the Wholesale bank Basel II requirements

The IBM home page can be found on the Internet at
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