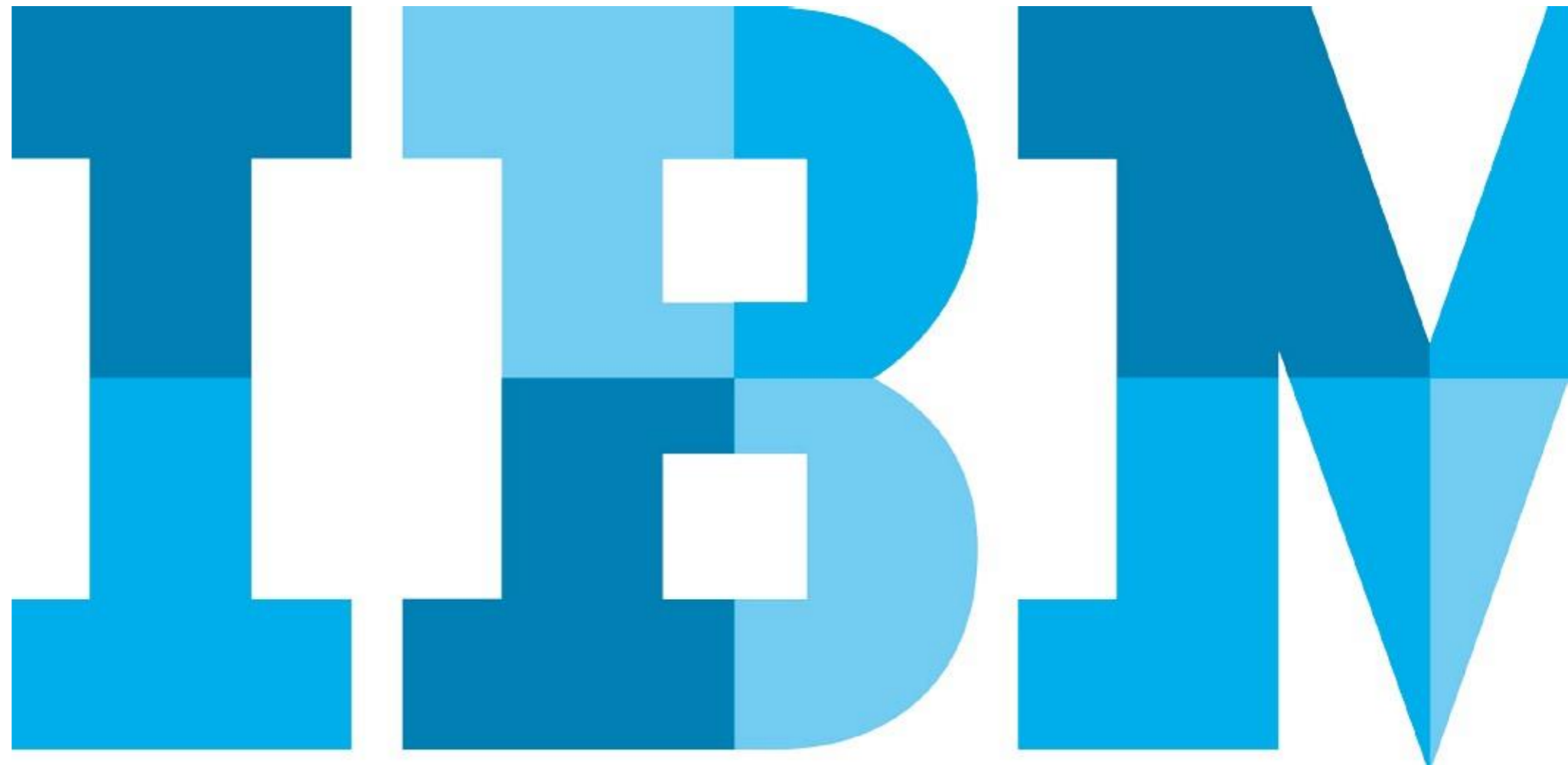


IBM Analytics

IBM Banking and Financial Markets Data Warehouse

Support for IFRS[®] Financial Instruments

A large, stylized IBM logo consisting of the letters 'IBM' in a bold, sans-serif font. The letters are filled with a pattern of blue and white squares, creating a pixelated or mosaic effect. The 'I' is a solid dark blue. The 'B' is composed of a dark blue left half and a light blue right half. The 'M' is a solid dark blue.

IBM

The Impact of IFRS Standards

IBM® Banking and Financial Markets Data Warehouse (BFMDW) provides a blue print for Financial Institutions to capture their financial reporting needs across their business units and meet the challenges of persistent change in their regulatory reporting requirements.

For many years Financial Institutions have been inundated with regulatory changes and new reporting requirements affecting all areas of their business.

Coping with regulations such as Basel and its multiple revisions has already provided ample evidence of the difficulties of the implementation and compliance with new regulations.

On the other hand, the advent of new technology and new approaches to data governance presents an opportunity to rethink these challenges and identify new approaches in extracting, transforming and aggregating insight across disparate systems in a cost-effective manner. This reduces the cost of implementing transformation projects and the total cost of ownership of the solution well into the future.

Many Financial Institutions are mandated to address the principals and reporting requirements of IFRS 7 Financial Instruments: Disclosures and IFRS 9 Financial Instruments. This will require a more ambitious and scalable solution to meet these extensive requirements.

IFRS 7 and IFRS 9 are an evolution of the accounting standards for financial instruments to deal with, among other issues, the evolving nature of financial instruments, the lessons learned from the financial crisis regarding delayed accounting for credit losses, recognizing risk management practices of hedging in the financial statement and recognition in changes of own credit risk. IFRS 7 and IFRS 9 require a significant upgrade of the current financial accounting practice which will potentially lead to more frequent granular reporting and the reconciliation across reporting periods and between different regulatory disclosure requirements.

Financial Institutions can now consider whether it is time to build a more robust common data warehouse approach that can

cope with the challenges of bringing together this information from finance and risk management systems. These IFRS Standards will require the consolidation of more granular levels of data beyond what they have needed to date. Integrating more data sources and reconciling these data sources will require better data governance.

With the appropriate tooling and architecture, and with the BFMDW glossary data warehouse models, Financial Institutions can look to design robust scalable information systems that meet not just the needs of the IFRS Standards but beyond to other information requirements and regulatory reporting.

BFMDW represents the IFRS Standards in a business readable structured glossary. These IFRS Standards terms are mapped to the Business Terms that describe them in relation to the enterprise-wide vocabulary. Finally, these Business Terms are mapped to the data warehouse models that represent the data structures needed to support a variety of information warehouse use cases.

IFRS Standards Key Challenges and Opportunities

Legacy versus New Systems

As much as is feasible, Financial Institutions will attempt to re-use as much of the existing processes and systems to address requirements of the IFRS Standards. This however could present a challenge governing data across different systems, in different formats, grain and terminology. The implementation of the IFRS Standards will require a change in how data is collected from systems and will require a more streamlined approach to the financial reporting processes. One off / manual reporting will need to be replaced with more fit for purpose reporting frameworks. Information needs to flow into a consolidated central financial data repository to feed the various intermediate processes and reporting requirements for the IFRS Standards.

New and Integrated Finance & Risk data

The IFRS Standards expand the scope of the data further into the realm of operational data looking for more data at a finer level of granularity. However, it now also requires the more careful alignment of risk and financial data in the assessment of expected credit losses and hedge accounting. This will have an impact on existing systems and processes, and careful consideration should be given to understanding, mapping and governing these data sources, so that when they are integrated, they can be easily reconciled, and their quality verified.

Monitoring and comparing of data

Financial Institutions need to monitor and maintain a history of their credit loss events, borrower default characteristics and other risk data to apply to their expected credit loss modelling. This requires a consistent, detailed source of consolidated information. The information must be provided in a flexible design that allows for ad hoc analysis to support the querying of the data for different risk, financial, profitability and regulatory needs. The information must be consistent and detailed to ensure the characteristics of the information are comparable and a full history of changes is maintained. More advantages Financial Institutions will build this business data into their analytical results to determine the long-term implications of the IFRS Standards, specifically the implication of enhanced expected credit losses on their product portfolio.

Data Governance

Traditionally, financial information has been embedded in accounting solutions and governance could be managed given the limited scope of the information to preparing financial reporting. However, given the expansion in scope of the data required and the onslaught of different regulations which Financial Institutions need to comply with, governance is becoming a central foundation of the modern best

practice financial reporting framework which Financial Institutions need to aspire to. Governance takes time to establish, requiring the right set of tools and support from business. BFMDW provides a glossary of terms which can be used in your governance tool such as IBM InfoSphere® Information Governance Catalog. The glossaries and mappings to data models identify the scope of the IFRS Standards terms and data model structures required. The glossary can also provide the target for mapping the information assets (system data) in your central financial data repository or data lake so that they can be easily governed.

IFRS Standards Terminology

IFRS 9 brings a new balance sheet terminology, in addition to an enlarged pool of data characteristics that must be identified, managed and communicated throughout the IFRS Standards solution architecture. It requires a governance infrastructure that supports the vocabulary and scope needs of each discipline from subject matter experts working in the accountancy practice to, risk modelers analyzing expected losses and hedging offsets to the IT experts implementing the technical solutions. It requires a solution that can describe the data and scope needs of each pool of resources and link them all together.

Transformation Projects

For some Financial Institutions, the IFRS Standards presents an opportunity to embark on a more ambitious program of financial transformation. There are a myriad of different accounting applications and approaches which present their own challenge. The challenge of integrating data from across the business presents an even greater challenge, while at the same time coming up with a standard language / terminology for defining and understanding this data.

BFMDW's well-defined glossary and data warehouse models can help save time and reduce risk / costs on financial transformation projects. By using BFMDW, Financial Institutions could accelerate the understanding of the scope and design of data structures for the IFRS Standards which could reduce the heavy burden on the business of implementing this financial transformation.

Approaches to the Chart of Accounts

Designing the type of data repository needed for the IFRS Standards requires consideration of how rich or complex the chart of accounts (i.e. the number of dimensions) will need to be. It may be advisable to go with a thin ledger complemented with the use of the sub ledgers.

The approach taken will depend on the data and information need. The important thing is to have data structures available and the options available to adopt the right approach for your accounting configuration in your data warehouse. IBM Banking and Financial Markets Data Warehouse provides a set of well conformed dimensions and facts which can be easily customized or adapted as needed.

Evolving Regulatory Landscape

The challenge of supporting many different disclosure and regulatory requirements cannot be underestimated. It may seem easier to buy an off the shelf embedded solution to address IFRS 9 or to address any given regulation for that matter. However, the question that remains is how to reconcile the information across different solutions.

Building a consolidated data repository can help streamline this reconciliation making it easier to compare the figures with conformed sets of dimensions and facts that are designed to support a wide variety of information requirements; from credit risk analysis, to customer experience insight, to profitability and now to the IFRS Standards. Many of the core transactions facts and dimensions describe the business data that is common to many regulations. Scalability is achieved through re-use of these common

elements across regulations and bringing in more elements from the BFMDW.

With BFMDW, Financial Institutions can start with one project such as IFRS 9 and then extend to support other information requirements as needed.

Hybrid Cloud Deployment

The latest IFRS Standards, by the nature of its high data volumes and data processing requirements, particularly, at certain times during the financial reporting period, suggests a new data management strategy is required to handle this level of activity.

The processing will need to scale up and down depending on level of processing required at the point in the reporting cycle. This seems quite suited to a cloud solution, which may be a good option for some Financial Institutions. BFMDW used in conjunction with IBM InfoSphere Governance Catalog can be used to map all types of information assets across your enterprise whether they are on premise or in the cloud. BFMDW's data models can be used to generate physical data models that can be used to deploy your data structures to your chosen database such as DB2 in the cloud. While the approach adopted may be different from one Financial Institution to the next, BFMDW is designed to support deployment of data warehouses either on premise or on the cloud.

Relational or Non-Relational?

Every significant investment in reporting systems is an opportunity to consider new approaches. The nature of the IFRS Standards is that the data required will be of greater velocity (i.e. greater amounts of data processed quickly), of greater volumes and the veracity or trustworthiness in the data needs to be assured. However, the data is generally structured and can be managed effectively with the use of relational databases and columnar capabilities. Alternatively, a Big Data platform such as Hadoop, could be used with BFMDW as a reference model. BFMDW can be an important enabler regardless of the option chosen.

Relational

BFMDW includes two design models for customers building relational databases, the Atomic Warehouse Model (AWM), which is intended to provide the basis for deployment of a central Inmon-style atomic data warehouse and the Dimensional Warehouse Model (DWM). Given the reporting nature for the IFRS Standards, the DWM might be a preferred implementation option. The DWM is intended to provide the basis for deployment of Kimball-style dimensional warehouse structures. It contains a suite of conformed dimensions and facts which follow the similar

business concepts as the AWM so making it easier for customers to transform from their atomic data structures to a dimensional representation. The DWM contains a suite of accounting dimensions and facts in addition to sets of dimensions/ facts to capture the relevant information around products, payments and projected cashflow, etc. With the DWM and mappings to the glossary, project teams focusing on the IFRS Standards should be able to quickly realize value of the coverage in the models for their project.

You can define your data model for the IFRS Standards from BFMDW using a design tool such as IBM InfoSphere Data Architect (IDA). IDA allows you to design and generate the corresponding physical model for deployment. The BFMDW Knowledge Center contains further insights on dimensional model techniques e.g. how to develop bridges, mini dimensions based on the Kimball approach, etc.

Non-Relational

One deployment approach that is being considered by Financial Institutions is the use of Hadoop as the basis for central financial data repository.

Hadoop is an open source, scalable, fault tolerant framework from Apache, that contains components such as Hadoop Distributed File System (HDFS) that makes it easy to process large volumes of big data.

There are several integration tools in the Hadoop eco system such as Hive, Pig and Spark. For this discussion here, we will elaborate on the use of Hive for data modeling. Hive is a data warehouse system that sits on top of HDFS that includes a SQL-like language called HiveQL which makes it easy to query structured and unstructured data.

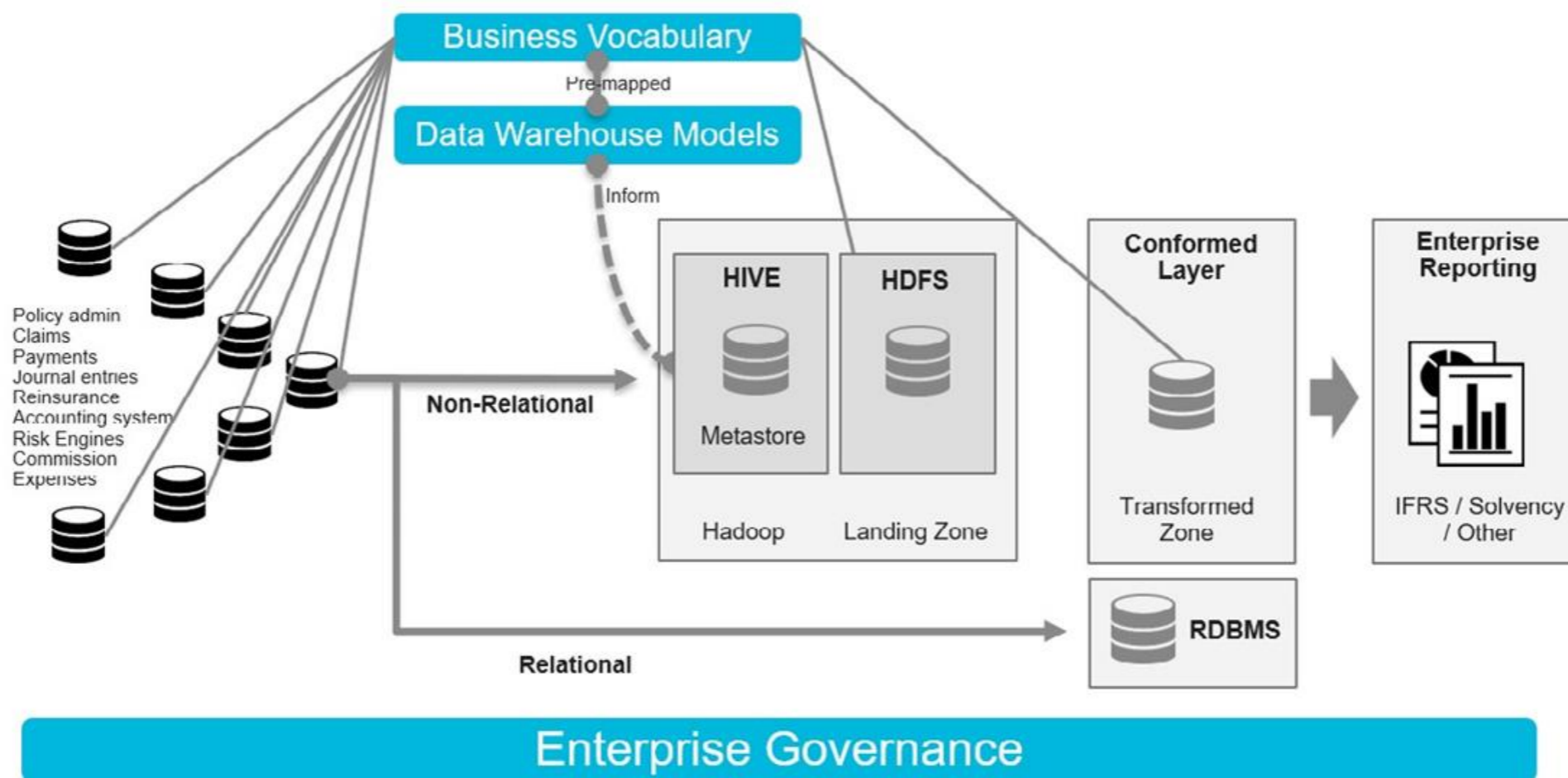


Figure 1 IFRS Standards project deployment options

Hive is useful for data modeling and given its batch oriented and high latency for query execution, it may be an option suited to the task of processing accounting data for Financial reporting processes.

In the case of Schema on write, BFMDW's AWM or DWM could be used as the basis for creating Hadoop/NoSQL repositories using Hive. But there are additional physical design considerations required whether BFMDW is being used or not as the basis of data model, such as optimizing the design of tables,

partitioning, bucketing and join strategies for performance and usability. Schema on read is suitable for data exploration or analytics in a sandbox and Schema on write is for when you need to build a production line of data that needs to be cleansed, transformed and reconciled such that it can feed your regular reporting disclosure to a higher standard of reliability. Hadoop silos can be a consequence of not producing an enterprise conformed layer for reporting. BFMDW's glossary of Business Terms can be used to map and support enterprise governance

regardless of the approach. It can aid understanding of data assets used in the preparation of your reporting requirements.

Financial Institutions can use BFMDW to accelerate the implementation of an IFRS Standards project then expand to other business requirements, leveraging the extensive glossary of business terms for better data governance.

BFMDW Components

BFMDW has the flexibility to create a range of data solutions from business analytics focused data marts to enterprise-wide data warehouses, data lakes, and enterprise vocabularies. It acts as an accelerator towards the implementation of solutions in a variety of business areas including digital insight. It is flexible enough to adapt to the differing needs of individual Financial Institutions and can be extended and customized to keep up to date with changes to requirements. It comprises the following components:

Business Terms - define and describe industry concepts in plain business language.

Analytical Requirements - enable the specification of subject matter specific reporting requirements and project scopes which can be used as input to data mart design in the data warehouse.

Supportive Content - provides a method of mapping both external regulatory and internal terminology from business standards and other requirements to the models.

Atomic Warehouse Model - a logical, specialized model that is optimized as a data repository, which can hold long-term enterprise-wide business data.

Dimensional Warehouse Model - a logical model that is an optimized data repository based on business activities and reporting needs.

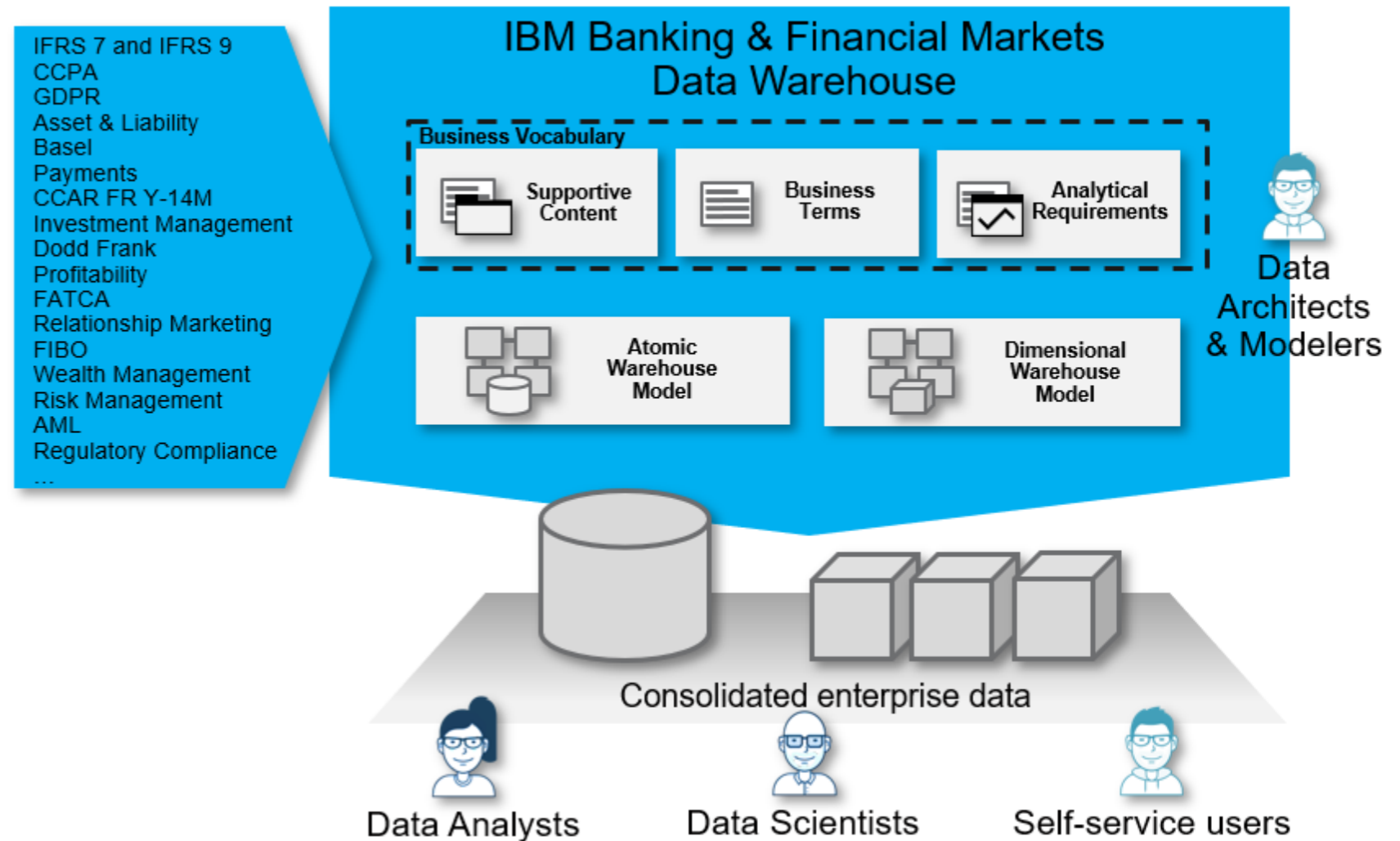


Figure 2 BFMDW Components

BFMDW Support for the IFRS Standards

BFMDW contains different components that can accelerate the design, deployment and governance of your IFRS Standards solution.

First, the information contained within the IFRS Standards is represented as an IFRS Standards vocabulary of terms. This allows a user to navigate items mentioned in the IFRS Standards by focusing on an IFRS Standard, document chapter or from an IFRS Taxonomy reporting element to the IFRS Standards

paragraphs. These terms are mapped to the BFMDW Business Terms glossary which allows the user to relate an IFRS Standards topic to the enterprise vocabulary. The Business Terms are used to map a data landscape of the Financial Institution's business information. The Business Terms can be used as a central reference point for the resolution of vocabulary across the enterprise.

From the Business Terms, a user can then navigate to the BFMDW Atomic or Dimensional Models that provide structures to support the design of a consolidated, focused data warehouse solution.

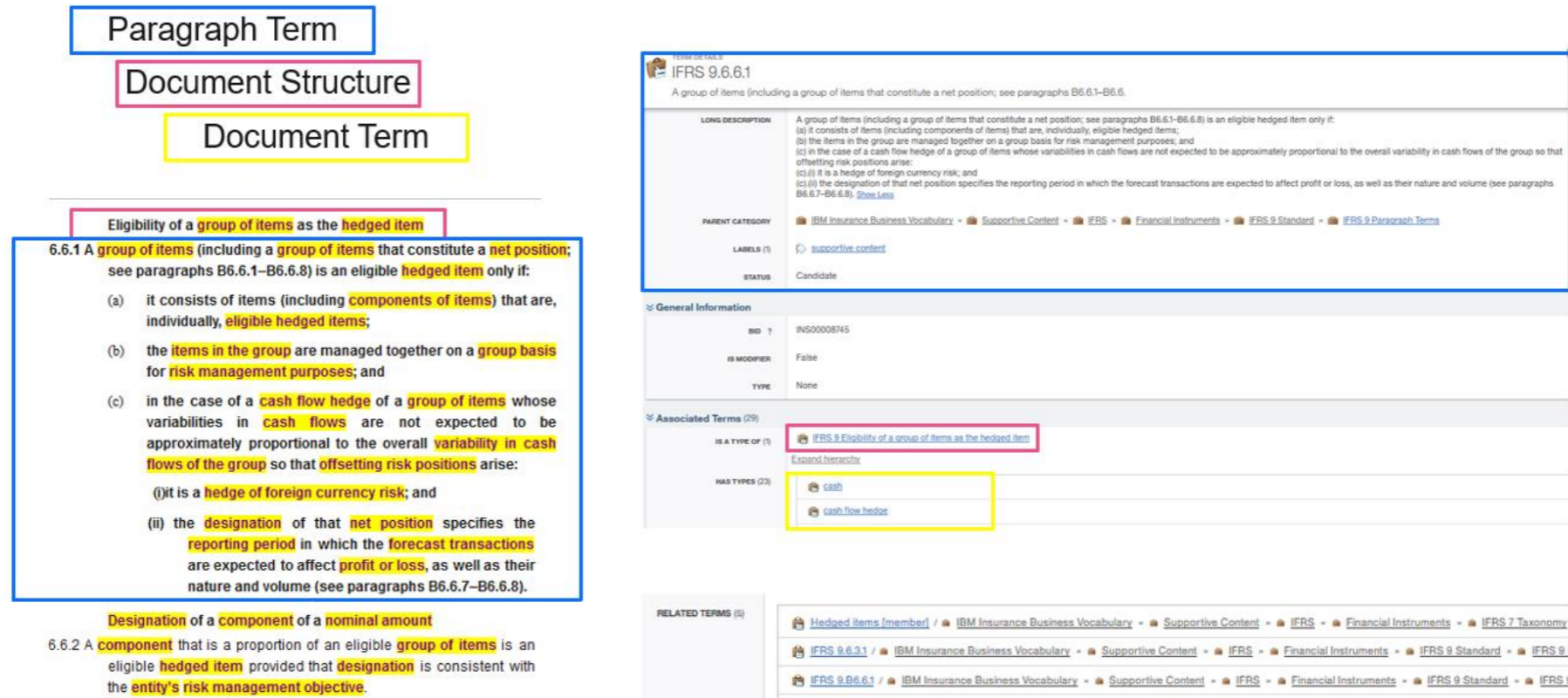


Figure 3 Representation of IFRS Standards terms in BFMDW

Supportive Content

IFRS Standards are represented in BFMDW as Supportive Content and include:

- Financial Reporting Standard Document Terms – which is an extensive consolidated set of terms representing the distinct pieces of information explicitly mentioned throughout the IFRS 7 and IFRS 9 Standards
- IFRS 7 Standard – structured representation of the IFRS 7 Standard chapters, paragraphs and referenced Document Terms
- IFRS 9 Standard – structured representation of the IFRS 9 Standards, chapters and paragraphs and referenced Document Terms
- Other Referenced Standards – a listing of paragraphs of other IFRS Standards referred to by IFRS 7 and IFRS 9
- IFRS 7 Taxonomy – structured representation of the IFRS 7 Taxonomy and IFRS 7 Taxonomy by Report elements. The IFRS Taxonomy terms representing the reporting items are mapped to the IFRS 7 and

IFRS 9 Standards Paragraphs that contain the Document Terms that detail the characteristics of that reporting item.

This is the BFMDW interpretation of the IFRS Standards data topics that make it easier for users of the glossary of industry model's business terms to understand the IFRS Standards and quickly identify the equivalent business terms in BFMDW to scope out your data requirements.

Business Terms Content

The IFRS Standard Document Terms are mapped to BFMDW Business Terms to correlate the IFRS Standards terminology with the enterprise terminology. The Business Terms are also extended to describe IFRS Standards data topics. This allows a user to relate the IFRS Standards terminology onto a consolidated enterprise-wide glossary. Existing customers can leverage their BFMDW implementations to identify support for the new topics covered under IFRS 7 and IFRS 9. For new customers,

this offers them the opportunity to quickly build out a focused, consolidated glossary that describes the IFRS Standards in their enterprise vocabulary. This glossary is then used to map out a data landscape where the relevant information is located and used.

Data Model Content

The Business Terms include enhanced mappings to the Data Warehouse Models to identify the explicit data warehouse structures required in the design of a consolidated data hub of information required for Financial Instrument characteristics and measurement. The Dimensional Warehouse Model has also been updated with new more specific mappings and star schema detail to model the financial instrument characteristics and measurement amounts. You can work with the business users using the glossary and quickly identify the sets of conformed facts and dimensions for your project implementation.

Collecting Data for IFRS Standards projects

IFRS Standards require a wide variety of data across your business. An understanding is required as to how the map out the information needed for IFRS 7 and IFRS 9 and understand how the various information points are related to one another. BFMDW can help with this aspect of an IFRS Standards projects with lineage through the glossary of business terms representing the IFRS Standard and industry terms and with well-defined data

patterns to map the domain of Financial Institutions accounting information. These can accelerate the design and delivery of a central data repository for financial information and reporting needs. Start with financial transformation and then reuse/expand for other projects across your business. BFMDW takes the key terms represented in the IFRS Taxonomy and

IFRS Standards then represents this in BFMDW's Supportive Content. These terms are mapped to BFMDW Business Terms which are then mapped to Data Warehouse Models. With the logical data models, it is possible to generate conformed data structures to support IFRS Standards information needs.

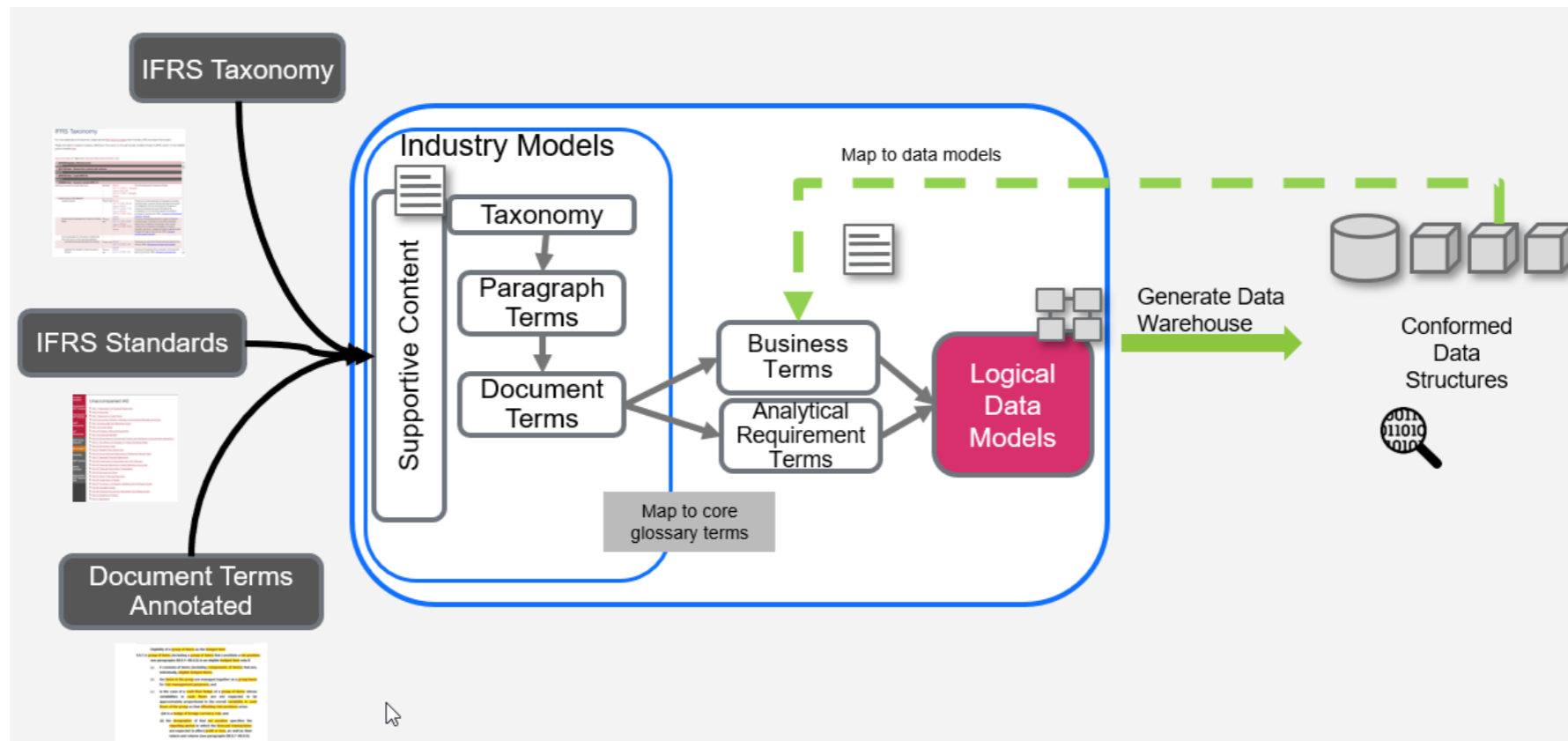


Figure 4 Overview of IFRS support in the BFMDW

BFMDW Building Blocks to Support IFRS 9 Financial Instruments and IFRS 7 Financial Instruments: Disclosures

BFMDW Model is a component of the overall IFRS Standards reporting solution. It provides the design for a common warehouse for the data needed to feed as input to calculations or storing the results of risk or accounting engines so that they can be used in financial reporting.

The key BFMDW data patterns can be used to capture the information needed and provide building blocks to supporting IFRS Standards reporting. The core concepts include support for:

Arrangement – describes the details of specific agreements between parties to the Financial Instruments including guarantees and collateral in place, credit enhancements, netting agreements, securitizations, etc.

Business Direction Item – describes the policies and intent of the Financial Institution, including the accounting policies, risk management approaches, hedging accounting and business objectives.

Classification – describes the categorization of information relating to the Financial Instruments and their disclosure including accounting categories, classifications, ratings, accounting periods, benchmarking, currencies, hedging, portfolios, indices, positions, etc.

Condition – describes qualification and requirements relating to the Financial Instruments and the manner in how business with them is conducted. For example, collateral requirements, contractual obligations, eligibility, terms of the contracts, etc.

Event – describes events occurring on the Financial Instruments including buying, selling, transferring, settlement, cash flow and payments, impairment and other activities including the generation of the financial statements, assessments and breaches.

Involved Party – describes all parties to the Financial Instrument including the reporting entity, borrowers, third parties, guarantors, holders, originators and their continuing involvement in the instrument, retained control, ability to repay, etc.

Location – describes the physical locations of collateral and Organizations and their customers, a place of occurrence of events including jurisdictions, countries and markets. Also used for modelling macroeconomic data such as unemployment rates.

Product – describes the goods and services that comprise the Financial Instruments and their characteristics including the contract instrument, life and transfer status, embedded derivatives, commitments, term, maturity, prices, etc.

Resource Item – describes the collateral, holdings and their characteristics including fair value, carrying amounts, whether they are held for sale or trading and other items of interest including the reported financial statements.

Measures – describe quantifiable information that is based on a combination or aggregation of the above concepts is included in the Analytical Requirement All Measures. For example, capital requirements, contractual cash flows, hedging and impairment gain or loss, dividend income, estimates, costs, leverage, goodwill, profit, retained interest, etc.

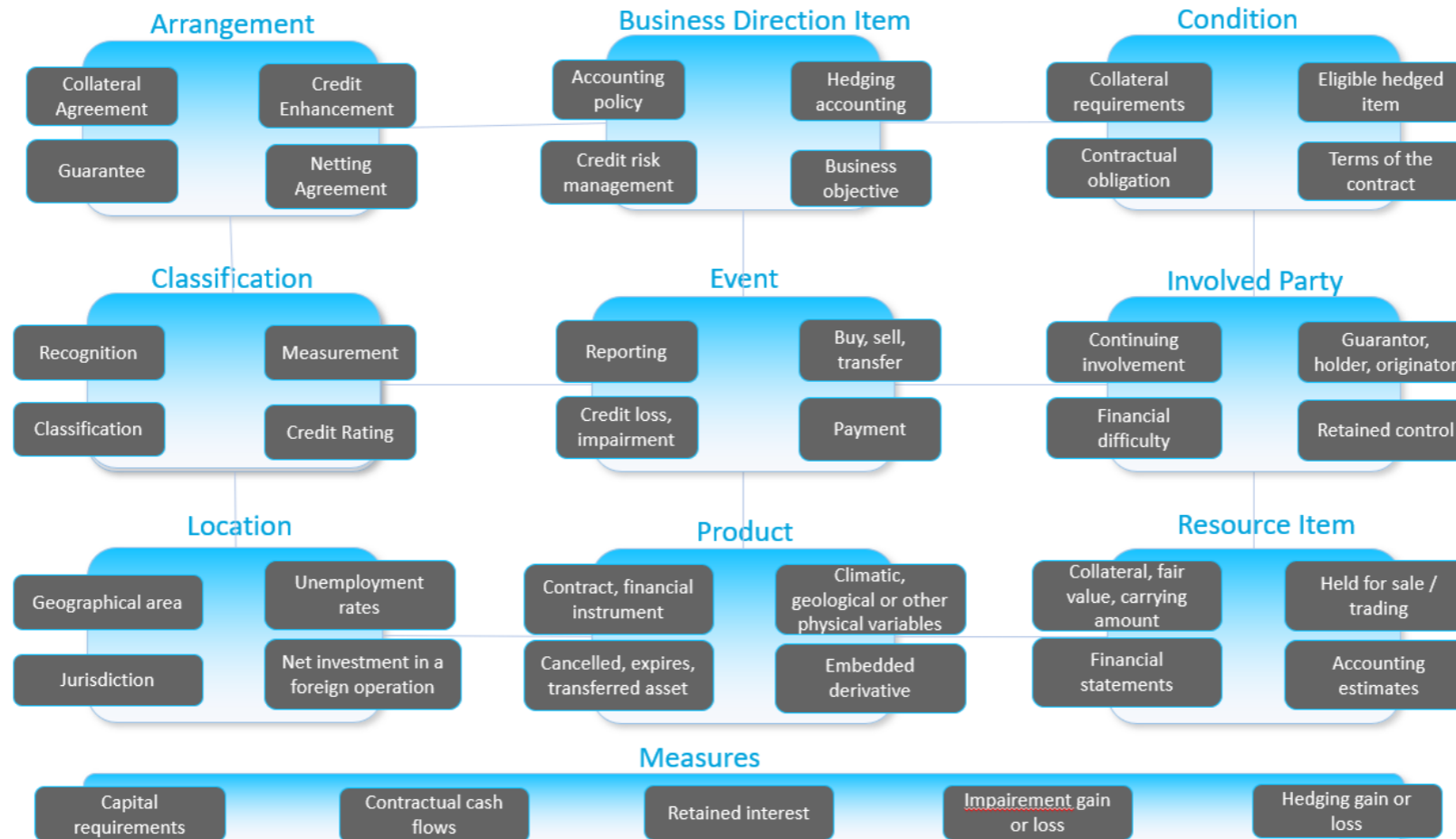


Figure 5 Examples of IFRS Standards topic support by BFMDW concept type

Using BFMDW for IFRS Standards projects

BFMDW help project teams accelerate their time to value by making it easier to navigate the IFRS Standards and IFRS Taxonomy and to quickly identify data points needed as input in the calculation of the report elements of the IFRS Taxonomy.

Project Approach to IFRS using IBM Banking and Financial Market Data Warehouse

Understanding IFRS

- Start by reviewing the IFRS Taxonomy and IFRS Standards
- Load the IBM Banking and Financial Market Data Warehouse Supportive Content for IFRS into IGC
- Within the Supportive Content, navigate from the IFRS Taxonomy terms to the IFRS Standard paragraph terms that contain the set of IFRS Standard document terms
- IFRS Standard document terms are mapped to IBM Banking and Financial Market Data Warehouse Glossary terms

Working with IBM Banking and Financial Market Data Warehouse

- Data governance – map source or feeder systems to the Glossary as a central reference of enterprise wide data and terminology
- Generation of a purpose built physical model using the Supportive Content to identify mandatory elements of the Data Warehouse models
- As a reference model – to extend existing data warehouses
- Scalability – ability to incorporate additional IBM Banking and Financial Market Data Warehouse components for future regulatory requirements

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