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IBM Telecommunications Data Warehouse

IBM® Telecommunications Data Warehouse (TDW) is a comprehensive set of business models that represents information modeling best practices in context with telecommunications services. TDW provides an information architecture blueprint with detailed business content that can be applied to many initiatives, either enterprise wide or project specific. TDW’s enterprise-wide ontology precisely defines the meaning of the many concepts that make up the core information and business environment of a communication service provider (CSP). It forms the basis for data warehouses, business intelligence (BI) systems, operational stores of data and other information-focused business solutions.

The Telecommunications Market

Telecommunications service providers’ strategic imperatives include managing the relentless business change that is driven by rapid technology advancement and convergence, deregulation and increased value chain complexity. Ever-increasing competition, interconnected next generation networks, service level optimization, syndicated content, as well as billing and process add to these. The corresponding information technology that supports these changes is complex and expensive, and expands as the telecoms business model expands. CSPs must respond to external market forces, while simultaneously transforming their legacy business models to become agile, dynamic and transparent. Data management in such a continuously evolving environment is extremely challenging and must account for operations support systems (OSS), business support systems (BSS), legacy source systems plus line of business requirements and scope that are constantly in motion.

The lack of standard business definitions is a key inhibitor to telecommunications business transformation. Some problem areas for CSPs include the ability to:

- Respond in real time to market demands and threats by integrating customer touch points to improve cross-sell and up-sell uptake, increase account penetration, and improve customer value contribution. High data latency and lack of common customer identifiers across lines of business and geographic regions limit these opportunities and expose telecoms to data privacy and non-solicitation compliance risks.
- Optimize parallel cost and capital base reengineering, consolidate and potentially outsource legacy OSS and BSS processes. Divergent data standards across lines of business, regions and functions inhibit such cost optimizations.
- Support process assurance requirements, especially those related to financial reporting and revenue tracking. Inconsistent key performance indicators (KPIs), definition and reporting and the lack of a chain of ownership for financial and performance data makes complete compliance difficult to impossible.
- Repositioning themselves in the value chain to optimize their risk-to-profit balance. Providers need better agreement on data standards with technical business partners, such as roaming partners, and within the supply and distribution chain comprising content, service and equipment providers, mobile virtual network operators (MVNOs) and resellers.

Making better decisions faster can be the sole difference between surviving and thriving in an increasingly competitive communications marketplace. CSPs rely on data warehouses, BI and related data management solutions to make decisions to support and transform their business models, but because telecommunications business volatility drives upgrades in OSS and BSS, plus continuous evolution of information requirements, and these changes affect data management solutions, realizing tangible benefits from business transformations is challenging without enterprise data standards.

Clients are therefore increasingly turning to data management solutions based on the TDW industry standard data model, which enable CSPs to use the potential of non-standard information whether locked in legacy systems or summarized and distributed in data marts. The benefits come in reducing project schedules, cost and risk.
A data warehouse is a central repository of detailed and summarized data from disparate internal operational systems, often supplemented with data from external sources. Operational and external source data is extracted, integrated, summarized and stored into a data warehouse, and can then be accessed by users in a consistent and subject-oriented format. Data organized around a business entity such as customer, product or service area is more useful for analysis than operational applications, which tend to be designed to support a vertical function of the business such as policy administration, accounts receivables or general ledger.

A data warehouse structure varies significantly from an online transaction processing (OLTP) system. Data in a warehouse compares to operational data as follows:

<table>
<thead>
<tr>
<th>Data Warehouse</th>
<th>Operational Data</th>
</tr>
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<tbody>
<tr>
<td>Archived or summarized</td>
<td>Current or near current</td>
</tr>
<tr>
<td>Organized by subject</td>
<td>Organized by application</td>
</tr>
<tr>
<td>Static until refreshed</td>
<td>Dynamic</td>
</tr>
<tr>
<td>Simplified for analysis</td>
<td>Complex for computation</td>
</tr>
<tr>
<td>Accessed and manipulated</td>
<td>Updated</td>
</tr>
<tr>
<td>Unstructured for analysis</td>
<td>Structured for repetitive processing</td>
</tr>
</tbody>
</table>

A data warehouse provides an online analytical processing (OLAP) data structure, rather than the operationally tuned OLTP data structure. A user wanting to perform OLAP can access many records per transaction, while OLTP users can only access one record at a time. Analytical users rarely update data and require response times ranging from minutes to hours, while OLTP users constantly update individual records and expect subsecond response times. An OLAP environment supports analytical queries against the data that represent an organization’s state at a specific point in time. An OLAP data structure describes the organization of the data prepared for use with analytical (multidimensional) tools and allows for accessing, storing and manipulating the forms of information required by Decision Support System (DSS), Enterprise Information System (EIS) and Management Information System (MIS) applications. For example:

- Complex, ad hoc queries are submitted and executed rapidly because the data is stored in a consistent format
- Queries do not interfere with ongoing operations because the system is dedicated to serving as a data warehouse
- Data consolidated from multiple sources can be organized by useful categories, such as customers or products

As data warehouses are typically run as stand-alone projects, building a data warehouse gives an organization a unique development opportunity. The results of implementing a data warehouse are immediate and quantifiable, and the implementation will not interfere with business operations. Because the operational data of internal systems and external feeds potentially comes from many different sources, the first step is to produce a logical model of the company’s organizational enterprise level data requirements, fully independent of any particular application.

To achieve the organization-wide benefits of this modern information management, a comprehensive specification of the organization’s existing data must also be defined. Because designing and implementing this solution is a complex process, often much more complex than expected or planned for, many organizations might not have all the appropriate in-house skills and resources available to complete the project.
Cost versus Value Justification

There are two points to consider when justifying the cost of constructing the data warehouse. The first point is that while operational cost reductions can be realized by analytical use of the information in the data warehouse, **incremental operational value can also be driven by it**. For example, using the data warehouse to omit non-responding or non-profitable customers has been estimated to save 10 percent of direct marketing operational costs.

**Second, the data warehouse facilitates the acquisition of future revenue.** The business drivers for this include the identification of new sources of revenue through more flexible market response capabilities and shorter product time to market. The resulting new products can generate faster-growing or new revenue streams. The data warehouse provides information about customer behavior regarding their profitability, wallet share and spending patterns, from which, opportunities can be identified to improve customer relationships, leading to increased customer satisfaction, product uptake and usage (penetration) and retention.

The effect is significant. A recent IDC report, “Financial Impact of Business Analytics”, found that data warehouse and business analytics implementation can generate a median five-year return on investment (ROI) of 112 percent with a mean payback of 1.6 years on average costs of USD4.5 million. Of the organizations included in this study, 54 percent have an ROI of 101 percent or more.

This report also shows that, although a business analytics implementation is a substantial investment for an organization, it can deliver considerable benefits. For the study participants, value accrued through quantitative and qualitative benefits that ranged from increased business performance to reduced operations costs and improved customer relations. These organizations consider their own business analytics implementations either a necessary cost of business or a critical factor in their plan for success and survival in a highly competitive market.

IBM helps organizations to accelerate achievement of similar results by providing a low-risk data warehouse solution, which forms the foundation for the entire data warehouse development.

### Business Advantages of Data Warehousing

<table>
<thead>
<tr>
<th>Competitive Advantage</th>
<th>For example, gained from focused marketing campaigns, product structuring and bundling, promotional pricing and cross-selling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Intelligence</td>
<td>For example, gained from understanding a customer’s value across all products and services, evaluating responses to total customer needs, performing predictive analysis to define preemptive approaches that focus on building and retaining a valuable customer base</td>
</tr>
<tr>
<td>Risk Mitigation</td>
<td>For example, gained from understanding experiences, and the ability to predict future outcomes, minimization of credit risk and better fraud detection</td>
</tr>
<tr>
<td>Profit Improvement</td>
<td>For example, gained from income planning, revenue optimization, accurate pricing and costing rules, understanding actual charges and discounts, analyzing historical activity and price performance monitoring</td>
</tr>
<tr>
<td>Organizational Efficiencies</td>
<td>For example, gained from creating profitable alliances, maintenance of optimal organization structure, quantifying measures and scores</td>
</tr>
</tbody>
</table>
Business advantage is gained from using information in the data warehouse to develop a coherent business strategy, enabling organizations to respond to the pressures of increased competition, the need to increase the speed of marketing activities, and to expanding market globalization and product innovations. The data warehouse can be used as a single source of consolidated data about:

<table>
<thead>
<tr>
<th>Historical business trends</th>
<th>Product gaps and opportunities</th>
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<tbody>
<tr>
<td>Activity and performance targets</td>
<td>Cross-selling opportunities</td>
</tr>
<tr>
<td>Customer market segmentation</td>
<td>Sales and distribution channel performance</td>
</tr>
</tbody>
</table>

Organization of information in this manner creates business advantage by identifying opportunities for:

<table>
<thead>
<tr>
<th>Focused marketing campaigns</th>
<th>Product customization</th>
</tr>
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<tbody>
<tr>
<td>Product bundling</td>
<td>Behavioral scores and rewards</td>
</tr>
<tr>
<td>Performance tracking</td>
<td>Cross-selling</td>
</tr>
<tr>
<td>Exposure management</td>
<td>Sales channel incentives</td>
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<tr>
<td>Promotional pricing</td>
<td>Competitor alliances</td>
</tr>
<tr>
<td>Wallet share and market share estimation</td>
<td>Forecasting and planning</td>
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**Building a Data Warehouse**

Achieving business transformation benefits through improved data management requires a comprehensive specification of an organization’s data and analytical requirements. This specification must use data and solutions models that are independent of volatile OSS/BSS data architecture and fixed analytical reporting requirements. Designing and implementing such data and solution models is a complex process for which many organizations do not have the appropriate skills available in-house. The best-practice solution is using commercial data and solution templates from third parties to reduce project risk, cost and time-to-implementation.

TDW enables CSPs to build data warehouse solutions to suit their specific needs using the included key components required for a data warehousing solution. TDW’s flexible and scalable data warehouse infrastructure and content lets a CSP build comprehensive enterprise data warehouses and departmental data marts through rapid, phased development. TDW unleashes high-value data management solutions by allowing a CSP to focus on those business areas that offer the greatest returns and are most technically feasible. This approach assures that parallel or subsequent projects are aligned to a single and proven data architecture.
Achieving rapid and successful analytical value requires the right balance of a comprehensive data schema design across operational, financial, and other data elements, paired with the ability to support existing models and technologies. Only a flexible model structure developed specifically for the telecoms industry can support this. IBM Telecommunications Data Warehouse (TDW) provides a glossary of requirements, terms and concepts that can be clearly understood and communicated by both business and IT. It helps to accelerate project scoping and data requirements gathering, facilitates appropriate reporting, and improves and identifies data sources. Ultimately, TDW acts as a blueprint by defining the structures necessary to build an effective data warehouse, and provides CSPs with critical prebuilt reporting templates that offer a wide and deep view of their business through key performance indicators (KPIs) and other measures.

As platform-independent models, TDW is the result of tens of thousands of hours of development effort and deep subject matter expertise, which helps business users and IT staff implement an enterprise data warehouse on time and on budget. It provides managers with critical predefined requirements definitions that offer a view of their business through key performance indicators (KPIs) and other measures.

TDW reaches far beyond simple data gathering. It offers a significant competitive advantage through the ability to continuously process data and transform it into information-led business initiatives. By unlocking information contained in individual applications and repositories from various vendors, and making it readily available to the people and processes that need it, IBM TDW can help get CSPs closer to a best-practice information management infrastructure.

TDW is a robust set of business and technical data models that are extensible and scalable to fit an CSPs unique environment and offers significant competitive advantage. It offers the ability to create an analytical data store that connects to the CSPs critical data, across disparate systems and formats, across diverse departments and other data providers. It helps to build a dynamic analytics environment, where data collected internally and externally is used to determine how to arrange, align, deploy and improve business performance. It forms the foundation of a true information management infrastructure where trusted, relevant information is available to the people who need it, when they need it, so that they can make better and more timely decisions.

TDW is a fully realized development blueprint enabling CSPs to build data warehouse solutions to suit their specific needs. It includes the key components required for the core of a data warehousing solution, offering:

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
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<tr>
<td>A flexible and scalable data warehouse design, enabling organizations to build a comprehensive data warehouse solution through phased development. This allows for rapid delivery of high-business-value deliverables by initially focusing on the business areas offering the greatest returns and feasibility, while building within a proven technical warehousing architecture.</td>
<td></td>
</tr>
<tr>
<td>Content to cover analysis in critical CSP business areas, detailed at the end of this manual.</td>
<td></td>
</tr>
<tr>
<td>Flexibility to enable the creation of a range of data warehouse solutions, from departmental data marts to enterprise-wide data warehouses.</td>
<td></td>
</tr>
<tr>
<td>A proven flexible and scalable data warehouse technical infrastructure required for successfully building a comprehensive data warehouse solution, and providing the rapid delivery of business value without compromising on a sound and scalable structure.</td>
<td></td>
</tr>
<tr>
<td>An infrastructure blueprint, consisting of Reporting Requirements based on thousands of common business definitions and logical data structures, TDW is used by CSPs to integrate data from multiple operational platforms and to design the data warehouse infrastructure.</td>
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Benefits and Advantages of TDW

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Description</th>
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<tbody>
<tr>
<td>Creates competitive advantage</td>
<td>by providing consolidated, consistent and usable data structures</td>
</tr>
<tr>
<td>Supports rapid implementation</td>
<td>of warehousing solutions by identifying meaningful analytical data</td>
</tr>
<tr>
<td>Provides a combination of sound infrastructure</td>
<td>techniques, a proven method for using data management product sets and</td>
</tr>
<tr>
<td>rich functional content</td>
<td>Can be integrated with data warehouse appliances, such as IBM PureData System for Analytics</td>
</tr>
<tr>
<td>Enables the customization and extension of the data warehouse</td>
<td>Lower total cost of ownership (TCO) by being easy to change, leading to a high degree of reusability and the ability to use existing company assets</td>
</tr>
<tr>
<td>Eases the customization and extension of the data warehouse</td>
<td>Helps reduce normal data warehouse development cost</td>
</tr>
<tr>
<td>Enables business users to more effectively control the definition and scoping of the data warehouse solution</td>
<td>Reduces project risks by providing a proven implementation roadmap.</td>
</tr>
<tr>
<td>Straightforward integration with applications needed in data warehousing phases such as Business Glossary, ETL, Insurance Analytics, Data Mining, OLAP and CRM tools</td>
<td>Enables the development of high-performance, scalable and very large data warehouses (VLDWs)</td>
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Uses of IBM Telecommunications Data Warehouse

<table>
<thead>
<tr>
<th>Use</th>
<th>Description</th>
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<tbody>
<tr>
<td>Common Customer View</td>
<td>Integrating customer identifiers, organizational structures and account hierarchies across lines of business and functions.</td>
</tr>
<tr>
<td>Product Life Cycle Management</td>
<td>Integrating product management and performance measurement across lines of business and functions.</td>
</tr>
<tr>
<td>Campaign Performance Management</td>
<td>Improving program planning and tracking of sales and marketing activities and performance metrics across channels and touch points.</td>
</tr>
<tr>
<td>Analytical Customer Relationship Management</td>
<td>Integrating customer segmentation, data mining, online analytical processing (OLAP) and campaign management in closed-loop customer relationship management (CRM).</td>
</tr>
<tr>
<td>OSS/BSS Re-engineering</td>
<td>Standardizing legacy data for migration to next-generation operational support systems (NGOSS), such as billing consolidation.</td>
</tr>
<tr>
<td>Data Warehouse and Data Mart Consolidation</td>
<td>Reengineering legacy data warehouse and BI infrastructure consolidating data repositories and analytical reporting requirements.</td>
</tr>
<tr>
<td>Other Data Management Solutions</td>
<td>Establishing data architectures for Enterprise Application Integration (EAI), Service Oriented Architectures (SOA) and other near-real-time data analysis, such as operational data stores for fraud management.</td>
</tr>
</tbody>
</table>

Data Integration and BI Self Service

TDW is designed with system-agnostic, platform-neutral data integration and change management at its core. This contrasts with deployments based on data models that are derived from or biased towards specific OSS/BSS source systems or a fixed set of BI requirements, and typically fail to integrate the data and therefore make query development difficult for IT and business end users.

TDW enables CSPs to create BI self-service models that clearly separate the responsibility for data integration from the responsibility for business analytics. TDW enables IT departments to take the lead in maintaining the integration of volatile source data. Lines of business can then focus on defining analytical requirements, priorities and designs.

Reengineering

TDW offers an iterative, project-by-project approach for reengineering an existing data warehouse or other OSS/BSS applications. The approach is based on cost/benefit analyses that assure a phased progression of low-risk, high-return projects aligned with business priorities.
IBM Data Model Benefits based on Client Case Study

The following charts are taken from the case study "Using Data Models to Maximize the Value of Your Data Warehouse" by Hurwitz & Associates. Hurwitz & Associates reviewed IBM's approach to leveraging data models to accelerate successful data warehouse deployments. In-depth interviews with customers provided the basis for this research. The companies interviewed found tangible and business benefits using the IBM technology.

**Business Benefits**

- DW aligned with Business Needs
- Reduced compliance risk
- Costs in building the DW
- Developer Productivity
- Customer/Executive Satisfaction
- Time to Value

Score (1-4) where 4 is the highest

**Technical Benefits**

- Framework of Terms Provided Standard Approach
- Standardization of Design and Implementation
- Design is More Accurate
- More Complete and Accurate Model
- Increase of Consistent Terminology in Requirements
- Increased Granularity of Info

Score (1-4) where 4 is the highest
The Business Terms (incorporating the Data Classifications) is a classification model designed specifically for the telecommunications industry, containing thousands of carefully constructed business definitions reflecting many person years of analysis. It provides an enterprise-wide view of generic information concepts in telecommunications.

The Business Terms model provides accelerated model development and helps maximize the value of information by putting it into the hands of business faster, with a high quality extensible design. The Business Terms model is a generic model, defining data that is common to all CSPs. The information reflected in the model is independent of organizational structure and has been validated by multiple CSPs.

The Business Terms is a business model that is:

- A vehicle for merging requirements of existing models
- Designed for stability, flexibility and reusability
- Inclusive of classification and inheritance
The Business Terms content and structure enable management to be proactive in their support and response to the
dramatic changes driving the telecommunications industry. The Business Terms represents up to 80 percent of the
information captured by a CSP's core business OSS/BSS applications (See: Using Data Models to Maximize the Value
of Your Data Warehouse, Hurwitz & Associates, 2007). The Business Terms are not merely a listing of data types and
definitions. Its structure addresses key issues facing CSPs in deregulation, competition and accelerating technological
change.

The Business Terms are structured in a hierarchical, top-to-bottom structure with multiple layers of business content models
containing industry standard business definitions. Each structure layer houses a model that builds on the previous layer with
more detail.

**Issues the Business Terms Address**

**Improved customer care**
The Business Terms model reflects the complex interrelationships between customers, and between customers and the CSP.
It distinguishes between the nature of the customers and the relationship the customer has with the CSP. The Business Terms
model is therefore a pivotal component in the CSP’s response to changing market dynamics, enabling the business to refine
its approach to the management of customer relationships, while providing information systems staff with a blueprint for
integrated customer care systems.

**Rapid development of new products**
The Business Terms model’s approach recognizes that products can be rapidly assembled from reusable components. It
maintains the distinction between sales and marketing products templates offered, technical product instances provisioned
and the product views required for financial reports. Further, it recognizes the complex ways in which a product can be
acquired by a customer and how that product operates for the consumer. By clarifying the distinction between technical
operation, marketing processes and the financial aspects of the products, the Business Terms model enables the CSP to plan
and manage the increasingly complex relationships between the products offered, the resources required to enable those
products and the longer-term product usage that materially affects the financial standing of the business.

**Complex relationships with competitors**
The Business Terms model’s content reflects that competitors might also be customers and occasionally even strategic
partners. It allows for defining and capturing these changing roles and the policies, regulations and agreements that affect
these roles.

**Integration of business and engineering**
By design and purpose, the Business Terms model does not logically differentiate data by source system. The model reflects
a fully integrated view of data accessible by all business segments. The model focuses on providing the CSP with a means of
understanding the different facets of each business challenge, and how those facets can be combined into a solution. It cuts
through the confusion of OSS/BSS applications, and provides the path to coordination across lines of business and functional
areas.
Business Terms Benefits

The Business Terms model has been developed with the assistance of telecommunications professionals. Its structure has been designed to facilitate the understanding and navigation of the model even by those who have had little exposure to data modeling. At the same time, the structure and rigor of the Business Terms model satisfies the needs of business analysts whose thinking is more methodical. The Business Terms model provides a communication bridge between the data warehousing project team and OSS/ BSS technical staff as well as line-of-business and functional users. In addition, the Business Terms model:

<table>
<thead>
<tr>
<th>Benefit</th>
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<tbody>
<tr>
<td>Fully complements the other models</td>
</tr>
<tr>
<td>Provides a structured starting point to integrate data and process</td>
</tr>
<tr>
<td>Provides a generic specification of data that helps to reduce redundancy and inconsistency across the enterprise</td>
</tr>
<tr>
<td>Provides common definitions for increasing reuse of data elements</td>
</tr>
<tr>
<td>Accelerates the application development lifecycle, reducing development costs and project schedules</td>
</tr>
<tr>
<td>Provides a consistent data architecture for modeling new or changed requirements</td>
</tr>
<tr>
<td>Provides a single framework that incorporates detail data, business rules and analytical requirements</td>
</tr>
<tr>
<td>Focuses the development effort on validating, enhancing and extending data requirements using an existing model rather than on labor-intensive and error-prone, custom data modeling</td>
</tr>
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The Nine Business Terms Model Data Concepts

<table>
<thead>
<tr>
<th>Entity</th>
<th>Description</th>
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<tbody>
<tr>
<td>Arrangement</td>
<td>Arrangement (AR) represents an agreement, either potential or actual, involving two or more Involved Parties, that provides and affirms the rules and obligations associated with the sale, exchange or provision of goods and services.</td>
</tr>
<tr>
<td>Business Direction Item</td>
<td>Business Direction Item (BD) records an expression of an Involved Party’s intent. These directions provide a clear and concise definition of an Involved Party’s mission, values, policies and procedures, regulations, goals, strategies, key success factors, assumptions, measures, financial forecasts and business plans.</td>
</tr>
<tr>
<td>Condition</td>
<td>Condition (CD) describes the specific requirements that pertain to how the business of a CSP is conducted and includes information such as prerequisite or qualification criteria and restrictions or limits associated with these requirements.</td>
</tr>
<tr>
<td>Classification</td>
<td>Classification (CL) identifies a value or qualifier that is a member of a data category. The purpose of the Classification entity is to provide a means by which the CSP may categorize information in the warehouse.</td>
</tr>
<tr>
<td>Event</td>
<td>Event (EV) includes service usages, customer communications, billing, network maintenance and other actions that customers, employees, business partners and other Involved Parties initiate with the CSP across the service delivery lifecycle.</td>
</tr>
<tr>
<td>Involved Party</td>
<td>Involved Party (IP) identifies any individual, group of individuals, organization, organization unit or employment position about which the CSP wants to keep information.</td>
</tr>
<tr>
<td>Location</td>
<td>Location (LO) describes a place where something can be found, an address or a bounded area, such as a country or state.</td>
</tr>
<tr>
<td>Product</td>
<td>Product (PD) describes the services, merchandise or facilities that can be offered, sold or purchased by the CSP, its competitors and other Involved Parties during the normal course of its business. Product also includes non-telecom goods and services that are of interest to the CSP.</td>
</tr>
<tr>
<td>Resource Item</td>
<td>Resource Item (RI) identifies a logical or physical item of value that is of interest to the CSP.</td>
</tr>
</tbody>
</table>
Reporting Requirements enable rapid scoping and prototyping of reports and data marts, which provide a subject-specific analytical layer in a data warehouse solution. Using the data warehouse modeling software, analysts and business users use Reporting Requirements to gather the reporting and analysis requirements of their organization quickly.

Each Reporting Requirement can be divided into measures, which are numerical facts that convey quantitative information of importance to the organization, and dimensions that categorize measures. These measures and dimensions are mapped back to the data warehouse so that the scoping of the Reporting Requirements automatically selects the most appropriate data warehouse entities and attributes to support those requirements. The analytics development team can use these Reporting Requirements to create designs for specific data marts or dimensional solutions that can serve as the source for a range of reports and charts.

Reporting Requirements offer:

- Coverage of major business intelligence issues faced by insurers.
- Mapping of each measure and dimension to the Data Warehouse Models and Data Mart Model for rapid and accurate scoping of the data warehouse for a specific business issue, while ensuring complete requirements-to-data traceability.
- Conformity of dimensions and measures across the enterprise.
- Predefined views allowing insurers to scope quickly a particular business requirement across multiple reporting and data repository structures. These views can be easily customized and expanded to address other business areas.

Reporting Requirements dramatically reduce the time and effort required in the analysis phase of the data warehouse implementation. High-quality information at this early analysis stage provides the correct scope and definition to reduce associated development risks and helps ensure a more successful implementation. Reporting Requirements are not just physical representations of the measures and dimensions to be included in a given report, they can also be used to identify the data structures needed to support the report data requirements, and to generate DDL to construct facts and dimension tables from which the report can be generated.

Supportive Terms

The Supportive Terms model maps external business standards terms to the Business Terms component. This helps business users understand how external business terms are represented in the models.

A key differentiator between Reporting Requirements and Supportive Terms is that Supportive Terms content is less structured and not defined as measures and dimensions, but as data elements presented in logical groupings, while Reporting Requirements describe reporting elements.

The purpose of Supportive Terms is to capture requirements in a particular domain of interest and then relate them to the data warehouse model entities, relationships and attributes that support those requirements. To this end, the Supportive Terms model is defined in the language of the users of the given application.
The Data Warehouse Model is a logical model consisting of more than 80 percent of the data structures typically needed by a CSP for a data warehouse. This platform-independent model can be automatically generated into a platform-specific physical data warehouse database once it has been customized to meet the exact requirements of the CSP.

A logical model is a representation of a CSP’s data or information requirements, and is represented in an Entity Relationship Diagram (ERD) with business definitions. The data needs are represented without consideration for technology constraints associated with platforms, tools and software or how the application is finally implemented. The Data Warehouse Model is generic and flexible in design and facilitates consistent understanding of a CSP’s data.

The Data Warehouse Model features a flexible system of record (the primary data storage area) as well as the summary tables typically needed by CSPs to aggregate detailed data for analytical purposes. The Data Warehouse Model is designed to be one step away from physical data base generation. Normally, only a portion of Data Warehouse Model is generated in the initial project phase. Over time, other areas can be incrementally generated as the CSP tackles more source systems and business areas.

This comprehensive data model is derived from the Business Terms and can be used as the basis for a detailed analysis of the business areas of most concern to CSPs.

**Uses of the Data Warehouse Model**

- The design blueprint for an enterprise data warehouse. It helps in the creation of a flexible and extensible data warehouse platform-specific physical database.
- A neutral reference point for consolidating multiple legacy data warehouses across lines of business or in the case of mergers and acquisitions.
- A data structure template for near-real-time data management solutions to support specific business applications such as CRM.

**Benefits of the Data Warehouse Model**

- Enables phased implementation based on prioritized business requirements.
- Supports easy, subsequent customization and extension of the data warehouse.
- Combines third normal form and star schema data model designs.

**Major Groupings in the Data Warehouse Model**

**System of Record**

This is the data warehouse component that is the primary storage area of detailed information. System of Records (SOR) is most often populated by extract, transform and load (ETL) processes from operational data. Typical SOR components or entities are:

| Campaign | Campaign identifies a process the CSP undertakes in order to accomplish specific business defined objectives. A campaign is generally addressed to a segment of the CSP’s potential and actual customers. |
**Channel**
Channel identifies the different delivery and communications mechanisms through which products and services are made available to a customer and by which the CSP and customers communicate with each other. A channel is a role played by either an Involved Party, such as Employee or Organization Unit, or a Resource Item, such as a Network Segment or Website. The lowest granularity of Channel is a matter of choice for the CSP. Some may want to identify Phone Booths (one single Resource Item) as a Channel, whereas others want to identify each individual Phone Booth (each a Resource Item). A Call Center (an Organization Unit) may be sufficient granularity as a Channel while others require recording of each Call Center staffer (Employee). Where a given Involved Party or Resource Item instance can both receive or distribute services, it may be appropriate to associate it with two Channels. For example, a Call Center Employment Position may be part of the Call Center Receipt Channel for service orders, but part of the Call Center Distribution Channel for product campaigns.

**Customer**
A Customer is a role played by an Involved Party that is receiving services or products from the CSP, or who is a potential recipient of such services or products.

**Network Component**
This is an electronic delivery device that is a logical grouping of network equipment items at the levels at which the network is managed. For example, a set of connected network components forms a telecommunications network. Network Component represents the logical component of the network that is physically implemented by Network Equipment items. Several Network Equipment items can combine to create a single logical Network Component.

**Segment**
Segment groups items such as Involved Parties (market segments) and products (product groups) for a useful operational purpose.

**Service Usage**
Service Usage describes the function or purpose of a telecommunications service or product, e.g., facsimile transmission, local call, by any Involved Party for the duration of the usage. It is a key entity for measuring use, profitability, service quality, and more.

**Financial Transaction**
Financial Transaction is the recording of events that change the CSP’s financial position or financial information base. For example: Financial Transaction #456 ‘Bill Refund’ is the result of John Doe’s ‘Complaint’ (Communication #342) to the CSP about overcharges on his telephony account (Arrangement #456123); Financial Transaction #321 is the recording of Jane Doe’s ‘Top-Up’ of prepaid credit from an ATM on April 17. All Financial Transactions may be added together up in the various Summary entities.

**Summary Area**
This area contains commonly used summaries and aggregations. These summary entities can be populated by aggregating in the SOR itself or by obtaining preaggregated sums from operational systems such as G/L account balances. Creating and maintaining such summaries in the data warehouse gives reuse that improves query performance, reduces overall system load and improves consistency in analysis. Summary entities are designed to store key metrics such as average revenue per user (ARPU), and status indicators such as active subscriber.

Summary Areas include these entities:

<table>
<thead>
<tr>
<th>Monitoring Unit Summary</th>
<th>Appends data summarized, aggregated, or derived by the data warehouse load process.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring Unit Balance</td>
<td>Appends summarized, aggregated, or derived data loaded as facts from operational sources, such as the General Ledger.</td>
</tr>
</tbody>
</table>
### Arrangement Summary
A Monitoring Unit Summary used to store aggregation at the Arrangement level, such as the credits, debits and outstanding balance on billing accounts. Once the summary is calculated at the Arrangement level, the summaries can be rolled up into larger arrangements groups based on dimensions such as Involved Party, Organization Unit, Product, Channel.

### Campaign Summary
A Monitoring Unit Summary used to track internal and external marketing events and segmentations that promote Products and other aspects of the business. The Campaign Summary entities enable the CSP to monitor the effectiveness and cost of Campaigns.

### Involved Party Summary
Some of the subtypes of Involved Party would typically require periodic summaries. The Involved Party Summary is required for Customer and Organization Unit. The purpose of such summaries is to record key indicators for the relevant item.

### Product Summary
Product Summary defines summarized product effectiveness measures such as profitability and usage rates.

### Segment Summary
A segment is concerned with the various ways in which items are grouped. Examples include: Involved Party Segments, Market Segments, Product Segments and Network Segments. Segment Summaries are structures used to hold aggregated metrics of different segments.

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**Data Mart Model**

The **Data Mart Model** is a logical model derived from the Business Terms and the Reporting Requirements and is provided an optimized data repository for supporting analytical queries. It provides the data design support needed to transform the enterprise-level business requirements into business-specific and efficient structures dedicated to the design of a dimensional data repository. This repository holds sufficient and complete data to meet the needs of business user analysis. Dimensional models are more easily understood by business users. They are optimized for data querying rather than for transactional speed, and their structure makes it easier to extend them to support new data requirements. New queries can be created without having to redesign the data structures, while old queries can still operate without change.

The Data Mart Model contains star schema style dimensional data structures organized around fact entities:

**Conformed Facts**
A measure for which a business definition has been agreed by all parties in the enterprise, so the fact can be used in analytic computations across separate data sources and with other conformed facts. Conformed Facts are represented as fact entities in the Data Mart Model.

**Fact Entity**
A Fact Entity groups a set of measures (facts) that all share dimensions at the same level of granularity. The measures in the Fact Entities support the Measures defined in the Reporting Requirements. The Fact Entity is the core entity of a dimensional data structure. All, or a subset of, the measures and dimensions that are held in a Fact Entity can be distributed to one or more downstream data marts. When a Fact Entity is reusable in different aggregation contexts, it is categorized as a Transaction Fact Entity, otherwise as an Aggregate Fact Entity.
**Transaction Fact Entities**

A Fact Entity that is reusable in different aggregation contexts is categorized as a Transaction Fact Entity. A Transaction Fact Entity is defined at a low level of granularity and with a number of dimensions that make its measures (transaction facts) reusable in multiple Aggregate Fact Entities. An instance of a Transaction Fact Entity represents the happening of an actual business transaction. It holds aggregatable or snapshot measures resulting directly from such business transactions at a detail level. Transaction fact support is now available for the following focus areas: Campaign management, Claim analysis, Cost and performance management, Customer management, Customer retention, Intermediary performance, Product management, Risk management, Sales forecasting, Segmentation discovery and management.

**Aggregate Fact Entities**

A Fact Entity that is not reusable in different aggregation contexts is categorized as an Aggregate Fact Entity. An Aggregate Fact Entity is defined at a low or high level of aggregation depending on the context in which it is used. The business context is defined by the Reporting Requirement that the Fact Entity supports. Its measures (aggregate facts) are aggregated from reusable transaction facts, or can originate directly from atomic information.

**Conformed Dimensions**

Dimensions are categories of data for example, Product Term. Conformed dimensions ensure that the dimension has the exact same meaning no matter where it is referenced from. This enforces the concept of the warehouse being the "single version of the truth.

**Mini Dimensions**

Grouped attributes used to perform analysis on a Fact Entity. Each attribute of a Mini Dimension has a set of discrete values, on which it is possible to aggregate the measures of a Fact Entity. Typically, the Mini Dimensions externalize attributes that represent an operational code, a flag or an indicator. Mini Dimensions are defined only for dimensions that would otherwise hold a substantial number of such attributes. By default, a Mini Dimension is created when the corresponding Dimension has at least five attributes that has a set of discrete values. Using the Mini Dimension rather than the more granular Dimension potentially reduces the volume of the Fact Entity, since the granularity of the fact is higher. Moreover, Mini Dimensions hold all columns on which users would typically run queries. Their existence makes profiling easier.

Using either the Data Warehouse or the Data Mart Model is a valid option for your enterprise data store, depending on your needs. You can use either for the lowest level of data granularity that supports your solution requirements.
Typically, the data structures are not available or accessible to create a broader, innovative analytics data warehouse or business intelligence platform. Current investments in analytics platforms, designed to support solely regulatory and quality reporting, have started your journey, but they are often engineered and optimized for that purpose. As you move from current tactical needs into the future, data access and consistency across the systems that capture and manage operational, financial and other data will probably not speak the same language. More specifically:

| The data you need is available across more than one application, but the data cannot be joined across systems that collect the information. |
| The same data elements are defined inconsistently, or you do not even have insights into the database. A significant normalization exercise is necessary to align the data definitions that you can run analytics against. |
| You do not want to place your agility and ability to innovate in the hands of a single software component, you want to use the value those solutions provide, but keep your options open and flexible to implement new scenarios, data sets and analytics as you need them. |

Building a data management infrastructure is a complex team effort, requiring contributions across operations, financial, business analysts and data architects. Establishing a common terminology and target model designed for current and future analytics needs can be an expensive and time-consuming effort requiring new resources and new skills dedicated to supporting future programs. Those resources are often allocated up supporting day to day operational and planning for tactical initiatives.

A data warehouse is a central repository of summarized data from disparate internal operational systems and external sources. Operational and external source data is extracted, integrated, summarized and stored in a data warehouse that can be accessed by users in a consistent and subject-oriented format. Data organized around business entities is more useful for analysis than data committed to applications that support vertical functions of the business.

A data warehouse provides online analytical processing (OLAP) rather than online transaction processing (OLTP). Users wanting to perform online analyses can access many records per transaction, while OLTP users can only access one record at a time. Analytical users rarely update data and can cope with response times that are not instantaneous, while OLTP users constantly update individual records and expect subsecond response times. An OLAP environment supports analytical queries against data, representing an organization's state at a specific point in time or over a period, since support of history is a key element of data warehousing. This type of tool also allows users to drill down to the summarized information for further detail.

The data warehouse is a single source of consolidated data that provides an enterprise-wide view of the business and becomes the main source of information for reporting and analyzing data marts that are departmental, line-of-business-oriented or business-function-oriented. The data warehouse overcomes limitations of older style decision-support systems:

| Complex, ad hoc queries are submitted and executed rapidly because data is stored in a consistent format |
| Queries do not interfere with ongoing operations because the system is dedicated to serving as a data warehouse |
| Data is consolidated from multiple sources, enabling data categorizations such as customer or product |
The data warehouse holds data about the business that can be used as the basis for supporting a detailed analysis of the areas of most concern to organizations today. This allows organizations to use the potential of information previously locked in legacy systems inaccessible to the business user.

The data warehouse promotes an open architecture in which each component adheres to industry standards. This allows organizations to implement the data warehouse using existing tools or preferred tools. The physical data warehouse infrastructure is tightly integrated with the logical environment, incorporating both the Data Warehouse/Mart model and Reporting Requirements. Organizations can automatically generate the required data structures for a full data warehouse physical environment. Reporting Requirements provide the basis for the design of physical structures that support OLAP Analysis, such as star schemas. They also provide substantial domain expertise to fast-start projects, helping to bring them to rapid implementation and benefits realization. The use of the data warehouse enables enterprise-wide standard definitions and consistency for all business intelligence data, while delivering this data across the organization on consolidated or multiple platforms. This allows for lower-cost maintenance and centralized control of all data, while retaining flexibility to enable users to select their preferred analytical applications for ease of use, preformed reports or complex analytics capabilities.

The full range of the Reporting Requirements are also delivered in the Data Mart Model. The Reporting Requirements, delivered in this format, have been validated to ensure subsequent deployment to environments such as IBM DB2, IBM PureData Systems for Analytics and IBM Cognos.

Typical implementation architecture using IBM software

IBM InfoSphere Data Architect is a collaborative data-design solution that helps you discover, model, relate, standardize, and integrate diverse and distributed data assets. It can be used to manage and extend the TDW. Using it can simplify and speed-up warehouse design, dimensional modeling, and change management by providing a tool to the warehouse data modelers and database administrators to design and manage a warehouse from an enterprise logical model.

IBM InfoSphere Business Glossary enables the creation and management of an enterprise vocabulary and classification system, with ready-to-use industry standard terms and definitions. It facilitates collaboration between business and technical users: data analysts, data modelers, BI and ETL developers, data stewards, business analysts, line of business managers, and governance committees.

IBM InfoSphere Information Server is a data integration platform that helps customers understand, cleanse, transform and deliver trusted information to business initiatives, including business analytics and data warehousing. It helps to create an accurate understanding of the business context associated with data for line-of-business and a comprehensive understanding of end to end data lineage for better governance.

IBM InfoSphere Warehouse is a complete data warehouse platform that delivers superior scalability and availability, design, build, and management tooling as well as business analytics. IBM DB2 Release 10 provides a powerful engine for dynamic warehousing with advanced features.

IBM Cognos software provides what your organization needs to become top-performing and analytics-driven. It helps users freely explore information, to analyze key facts, to quickly collaborate to gain alignment with key stakeholders, and plan and act with confidence to drive better business outcomes.
IBM Smart Analytics System is a deeply integrated and optimized, ready-to-use analytics solution that provides insurers with broad analytics capabilities on a powerful warehouse foundation with IBM servers and storage. The IBM Smart Analytics System family offerings span multiple hardware platforms and architectures, providing maximum flexibility for deployment. They are preintegrated and optimized to ensure quick implementation with rapid delivery of value.

IBM PureData Systems for Analytics provides simple deployment, simple optimization, no tuning and minimal on-going maintenance. The PureData data warehouse appliance has the industry’s fastest time-to-value and lowest total cost of ownership. It is a purpose-built, standards-based data warehouse appliance that architecturally integrates database, advanced analytics, server and storage into a single, easy-to-manage system that offers significant performance and scalability.
Business Scope

Service Management - Core Services Usage/Experience/Availability

**Voice Usage/Experience/Availability Analysis** - To evaluate the Voice Usage behavior of subscribers to the CSP. / To evaluate the subscribers experience while using the Voice service of the CSP. / To evaluate the availability of the Voice service from the CSP.

**Broadband Usage/Experience/Availability Analysis** - To evaluate the Broadband Usage behavior of subscribers to the CSP / To evaluate the Subscriber experience while using the Broadband Service of the CSP. / To evaluate the availability of the Broadband service from the CSP.

**Online Usage/Experience/Availability Analysis** - To evaluate the Online Usage behavior of subscribers to the CSP. / To evaluate the Subscriber experience while using the Online Service of the CSP. / To evaluate the availability of the Online service from the CSP.

**Email Usage/Experience/Availability Analysis** - To evaluate the Email Usage behavior of subscribers to the CSP. / To evaluate the Subscriber experience while using the Email Service of the CSP. / To evaluate the availability of the Email service from the CSP.

**SMS Usage/Experience/Availability Analysis** - To evaluate the SMS Usage behavior of subscribers to the CSP. / To evaluate the Subscriber experience while using the SMS Service of the CSP. / To evaluate the availability of the SMS service from the CSP.

**MMS Usage/Experience/Availability Analysis** - To evaluate the MMS Usage behavior of subscribers to the CSP. / To evaluate the Subscriber experience while using the MMS Service of the CSP. / To evaluate the availability of the MMS service from the CSP.

**IPTV Usage/Experience/Availability Analysis** - To evaluate the IPTV Usage behavior of subscribers to the CSP. / To evaluate the Subscriber experience while using the IPTV Service of the CSP. / To evaluate the availability of the IPTV service from the CSP.

**VOD Usage/Experience/Availability Analysis** - To evaluate the VOD Usage behavior of subscribers to the CSP. / To evaluate the Subscriber experience while using the VOD Service of the CSP. / To evaluate the availability of the VOD service from the CSP.

**Content Service Usage/Experience/Availability Analysis** - To evaluate the Content Usage behavior of subscribers to the CSP. / To evaluate the Subscriber experience while using the Content Service of the CSP. / To evaluate the availability of the Content service from the CSP.

Service Management - Customer Services

**NEW** **Self Service Usage Analysis** - To evaluate the Self Service Usage behavior of subscribers to the Communication Service Provider.

**NEW** **Self Service Experience Analysis** - To evaluate the Subscriber experience while using the Self Service facilities of the Communication Service Provider.

**NEW** **Self Service Availability Analysis** - To evaluate the availability of the Self Service facilities offered by the Communication Service Provider.

**NEW** **Call Centre Usage Analysis** - To evaluate the Call Centre Usage behavior of subscribers to the Communication Service Provider.

**NEW** **Call Centre Experience Analysis** - To evaluate the Subscriber experience while using the Call Centres of the Communication Service Provider.

**NEW** **Call Centre Availability Analysis** - To evaluate the availability of the Call Centre Services offered by or on behalf of the Communication Service Provider.

**NEW** **Number Porting Efficiency Analysis** - To evaluate the efficiency of the processes around number porting and the experience of customers using this service.
Service Management - Monetary Services

**Top Up Behavior Analysis** - To evaluate the Top Up behavior of subscribers to the Communication Service Provider.

**Top Up Financial Analysis** - To evaluate the Top Up Financial behavior of subscribers to the Communication Service Provider (CSP) including monetary value of top ups and any free credits or other promotions offered by the CSP.

**Top Up Experience Analysis** - To evaluate the Top Up Experience of subscribers in a Communication Service Provider's network including the ease of access to top up services and the efficiency of the processes.

**Pre Paid Analysis** - To evaluate the behavior of subscribers who avail of Pre Paid services in a Communication Service Provider’s network.

**NEW Billing Efficiency Analysis** - To evaluate the efficiency of the Communication Service Provider’s Billing processes.

**NEW Billing Experience Analysis** - To evaluate the experience of the customers of the Communication Service Provider (CSP) in relation to the billing process and the incidence of billing errors.

**NEW Cost Of Billing Process Analysis** - To evaluate the costs associated with the Billing Process of the Communication Service Provider.

**NEW Customer Payment Analysis** - To evaluate Customer Payment processes of the Communication Service Provider in terms of payment accuracy and timeliness.

**NEW M-Commerce Usage Analysis** - To evaluate the use of mobile commerce (M-Commerce) facilities by subscribers to the Communication Service Provider.

**NEW M-Commerce Experience Analysis** - To evaluate the experience of customers of the Communication Service Provider (CSP) while using the mobile commerce (M-Commerce) services of the CSP.

**NEW M-Commerce Availability Analysis** - To evaluate the availability of the mobile commerce (M-Commerce) services of the Communication Service Provider.

Usage

**Content Profitability and Usage Analysis** - To evaluate the usage by the Communication Service Provider’s customers of its content products (e.g., news, entertainment, stock quotes, etc.) and applications services (e.g., games, gaming and financial services, etc.) including patterns of sessions, subscriptions and transmissions by different content types, providers and channels.

**E-Commerce Analysis** - To evaluate the electronic shopping behavior of the Communication Service Provider's including patterns of sessions, visits, market baskets, payment methods, etc.

**Inbound Roamer Usage Analysis** - To evaluate the Roaming Usage by the Communication Service Provider’s customers of its products and services, including patterns of trips and interconnect revenue by different products and channels.

**Outbound Roaming Analysis** - To evaluate the Roaming Usage by the Communication Service Provider’s customers of its products and services, including patterns of trips and interconnect revenue by different products and channels.

**Pre-Rated CDR Analysis** - To investigate the types, amounts and origin of traffic being carried on Network Segments, and their contribution to overall network capacity uptake.

**Product Usage Analysis** - Product Usage Analysis is the analysis of how different demographic groups are using the Communication Service Provider’s Products.

**Wireless Data Usage Analysis** - To evaluate the Wireless Usage by the Communication Service Provider’s customers of its data products (e.g., GPRS, WAP, etc.) including patterns of sessions and transmissions.
Wireless Voice Usage Analysis - To evaluate the Wireless Usage by the Communication Service Provider’s customers of its voice products (e.g., local voice, National Long Distance, International Direct Dial, International Inbound Roaming) including patterns of usage.

Wireline Data Usage Analysis - To evaluate the Wireline Usage by the Communication Service Provider’s customers of its data products (e.g., Leased Lines, ISDN, dialup Internet, xDSL, VOIP, Digital Television) including patterns of sessions and transmissions.

Wireline Voice Usage Analysis - To evaluate the Wireline Usage by the Communication Service Provider’s customers of its voice products (e.g., Local Voice, National Long Distance, International Direct Dial, etc.) including patterns of usage.

VAS Usage Pattern Analysis - Value Added Services Usage Pattern Analysis is the analysis of how different customer groups are using the Value Added Services.

**TMForum Business Benchmarking Metrics**


NEW Data Quality and Coverage Analysis - These KPIs measure the quality of data within different Communication Service Provider systems and the coverage of Revenue Assurance activities including the percentage of data validated and the percentage of discrepancies in data between systems.

NEW Revenue Assurance Process Efficiency Analysis - These KPIs measure the efficiency of Revenue Assurance processes within a Communication Service Provider including revenue recovered and the recovery period.

NEW Revenue Leakage Analysis - These KPIs measure the percentage and the value of revenue leakages of a Communication Service Provider including the percentage of discovered leakage out of total revenues.


NEW Fulfillment Customer Experience - Fulfillment Customer Experience is the analysis of customer orders for services and the ability of the Communication Service Provider to complete or fulfill these requests. It is based on TM Forum measures defined in the Business Performance Measurement System document.

NEW Fulfillment Operational Efficiency - Fulfillment Operational Efficiency is the analysis of the Communication Service Provider processing of customer fulfillment requests, the success rate and the costs associated. It is based on TM Forum measures defined in the Business Performance Measurement System document.

NEW Assurance Customer Experience - Assurance Customer Experience is the analysis of the incidence of problems maintaining a satisfactory service to customer within the terms of their service level agreement (SLA) and the resolution of these problems. It is based on the TM Forum measures defined in the Business Performance Measurement System document.

NEW Assurance Operational Efficiency - Assurance Operational Efficiency is the analysis of failures, time to resolve them and their associated costs. It is based on the TM Forum measures defined in the Business Performance Measurement System document.


NEW Operational Support Efficiency - Operational Support Efficiency is the analysis of the process of introducing new or modified tariffs. It is based on the TM Forum measures defined in the Business Performance Measurement System document.

Relationship Marketing

Campaign Analysis - To analyze and compare the effectiveness of customer and product promotions, marketing drives, and advertising.

NEW Promotion Analysis - To analyze the CSP’s promotions. The analysis is intended to connect planned promotions with results in the form of changes in transactions, revenue, customer visits, and/or interactions.

Contract Renewal Analysis - To evaluate the extension and renewal of Service Usage Arrangements (i.e., contracts) by the Communication Service Provider’s customers.

Cross Sell Analysis - To analyze the characteristics of multi-product usage by customers. Identifying profitable usage trends of a base product and suggesting complementary product and service bundles.

Customer Acquisition Analysis - To analyze the types of Customer that are joining the Communication Service Provider (CSP), their reasons for doing so and the Channels that are acquiring them with a view to establishing the most cost-effective ways of growing the CSP’s Customer base.

Customer Arrangement Analysis - To analyze Account Arrangement for customers of the Communication Service Provider including end users per account, churn rate and new users.

Arrangement Churn Analysis - To understand the reasons customers close arrangements with the Communication Service Provider (CSP) and the impact of such closures on the CSP.

Customer Complaints Analysis - To understand the pattern of complaints raised by customers of the Communication Service Provider (CSP) and the effectiveness of the CSP’s complaint resolution process.

Customer Interaction Analysis - Analysis of how the Communication Service Provider interacts with its customers, and the effectiveness of various Communication Types and Channels in terms of retaining customers and winning new business.

Data Package Sales Analysis - To evaluate the performances of channels and campaigns to sell data packages (e.g., GPRS, ADSL, etc.) to customers of the Communication Service Provider.

NLD / IDD Defection Analysis - To evaluate the usage of competitor National Long Distance (NLD) and International Direct Dial (IDD) gateways and prefixes by the Communication Service Provider’s subscribers including patterns of usage and lost revenue estimates.

Number Portability Analysis - To evaluate the acquisition and loss of subscribers by the Communication Service Provider due to number portability regulations.

Wallet Share Analysis - To identify the total communications spend of Customers compared to their utilization of products and services of the Communication Service Provider, with a view to measuring the realized and unrealized revenue and income opportunity.

Customer Profiling Activity - To profile customers of the Communication Service Provider CSP based on their activities and on facts about the customer that are known to the CSP.

Customer Profiling Survey Response - To profile customers of the Communication Service Provider based on their survey responses.

Customer Churn Analysis - To understand why customers of the Communication Service Provider (CSP) cease to use the CSP’s products and services and the impact this has on the CSP.

Customer Churn Financial Analysis - Analysis of the financial impact of Customer Churn behavior where customer leave the Communication Service Provider (CSP) to avail of the products and services of a competitor or where customers come to the CSP from a competitor.
**Customer Churn Propensity Analysis** - Analysis of the tendency and estimated likelihood of customers or types of customers of the Communication Service Provider (CSP) to leave the CSP to avail of the products and services of a competitor.

**NEW Tariff Optimization Analysis** - To analyze the Tariffs offered by the Communication Service Provider (CSP) and how effective they are in generating profitable revenue and to evaluate the tariff setting processes of the CSP.

**NEW Customer Loyalty Analysis** - To understand the determination customers have for continuing to use the services of the Communication Service Provider, while recognizing the customers have alternative choices.

### Profitability

**Customer Profitability Analysis** - To evaluate the contribution to profit of the customers of the Communication Service Provider.

**Market Basket Analysis** - To analyze the products bought by customers of a Communication Service Provider and especially the mix of products purchased together in single transactions (market baskets) based on brand, channel, campaign season, region, store location, product and many other factors.

**Outlet Location Profitability Analysis** - To analyze a Communication Service Provider’s retail store performance based on geographic location, demographics, store format and proximity to competitors.

**Product Profitability Analysis** - To evaluate the contribution to profit of the various products and services of the Communication Service Provider.

**Retail Transaction Analysis** - To evaluate the Retail Transactions made by the Communication Service Provider's customers of its products and services, including volumes and time periods.

**Sales Channel Analysis** - To identify the contribution to profit of the Communication Service Provider's sales channels, including value-added resellers (VARs), interconnected carriers, virtual network operators and communications services providers, as well as other channel partners.

**Advertising Profitability Analysis** - To identify the contribution to profit of the Communication Service Provider's advertising services.

**Advertising Inventory Management Analysis** - To monitor advertising inventory of the Communication Service Provider ensuring that sufficient advertising materials are available to support the activities of the organization.

### Finances

**Customer Delinquency Analysis** - To analyze Customers who have at least at least one Arrangement that has been deemed delinquent, in terms of the length of time for which the delinquencies, such as missed payments, have occurred and the amounts outstanding.

**Customer Lifetime Value Analysis** - To evaluate the total projected earnings of a customer to the Communications Service Provider over the probable lifetime of that customer.

**Financial Management Analysis** - To measure and report the results of the Telco organization and to provide other analytical information such as performance measurements for internal use of the management of the organization. For example, production of Balance Sheets, Income Statements (Profit and Loss Accounts), allocation of costs between organization units, as well as key indicators of the financial strength of the Telco organization under GAAP and adjustments (non-GAAP) such as Average Revenue Per User (ARPU), Cost per Gross Addition (CPGA), Cash Cost Per User (CCPU), COGS (Cost of Goods Sold) and EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization).
Financial Summary Analysis - To support the Telco Organization in the generation and analysis of the Security And Exchange Commissions (SEC) 10Q and 10K reports which support the Telco Organization with regard to compliance with Sections 302 and 404 of the Sarbanes Oxley Act.

Income Analysis - To evaluate the Income of the Service Provider by Operating Segment, Product, Channel, Market, etc.

Income Statement Analysis - To analyze a Telco Organization’s Income Statement. The Income Statement is a financial report that by summarizing revenues and expenses, and showing the net profit or loss in a specified accounting period it depicts a Telco Organization’s financial performance due to operations as well as other activities rendering gains or losses. Also known as the profit and loss statement. The Sarbanes Oxley Act Income Statement Analysis template assists Telco Organizations in optimizing report generation with regard to the Securities And Exchange Commissions (SEC) 10Q and 10K regulatory filing requirements.

Individual Credit Risk Profile - To analyze the customers of the Communication Service Provider (CSP) in terms of the CSP’s exposure to risk of default based on a number of credit risk indicators.

Individual Customer Financial Analysis - To analyze the value of a customer to the Communications Service Provider including the income they generate and associated costs as well as projected revenues.

MVNO Cost Plus Revenue Analysis - To evaluate Mobile Virtual Network Operator (MVNO) revenue from the perspective of both the Mobile Network Operator (MNO) and MVNO for the purpose of revenue optimization, pricing and yield management. This cube uses the Cost Plus (CP) methodology in evaluating the CP Network Charge Amount.

MVNO Retail Minus Revenue Analysis - To evaluate Mobile Virtual Network Operator (MVNO) revenue from the perspective of both the Mobile Network Operator (MNO) and MVNO for the purpose of revenue optimization, pricing and yield management. This cube uses the Revenue Minus (RM) methodology in evaluating the RM Network Charge Amount.

MVNO Service Analysis - To measure the critical factors involved with the efficiency of service both from the perspective of the MNO, the MVNO and customers of the MVNO. The MVNO Customer Services metrics include data content success, portal availability, download availability, streaming availability, browsing performance and Web Errors. MNO to MVNO metrics include Billrun and invoice generation, real versus batch time rating, CRM/Back end performance.

Postpaid Revenue Analysis - To evaluate the use of Postpaid products and services by customers of the Communication Service Provider including revenue contribution for the purpose of revenue optimization, pricing and yield management.

Prepaid Revenue Analysis - To evaluate Prepaid voucher sales revenue and entitled usage of the Communication Service Provider’s prepaid customers for the purpose of revenue optimization, pricing and yield management.

Service Order Processing Analysis - To measure the critical factors involved with the efficiency of handling requests for services, both from Customers and from within the Communication Service Provider. The Service Order Process includes acceptance of an order for service, tracking the progress of the Order, updating the requestor at appropriate times and notifying the requestor when the Order is complete. Orders can include new, change and disconnect orders for all or part of a customer’s service, as well as cancellations and modifications to Orders.

Statement Shareholder Equity Analysis - To analyze a Telco Organization's Statement Of Shareholders' Equity. Which includes net profit / loss for period, issuance and repurchase of stock, other gains and losses recognized directly in shareholders equity and the impact of changes in accounting policy and fundamental errors when these are presented as a prior period adjustment. The Sarbanes Oxley Act Statement Of Changes In Shareholders’ Equity Analysis template assists Telco Organizations in optimizing report generation with regard to the Securities And Exchange Commissions (SEC) 10Q and 10K regulatory filing requirements.

Stock Availability Analysis - To analyze the amount of stock (inventory) held by the Communication Service Provider in its various locations and the amount of stock on order in relation to expected sales demand and scheduled replenishment deliveries.

Balance Sheet Analysis - To analyze the Telco Organization’s 10Q and 10K Balance Sheets which report the Telco Organization's total assets, total liabilities, and total shareholders equity at a specific time. The Sarbanes Oxley Act Balance Sheet Analysis template assists Telco Organizations in optimizing report generation with regard to the Securities And Exchange Commissions (SEC) 10Q and 10K regulatory filing requirements.