Data Migration:

The Often Overlooked Critical

Path to OSS/BSS Consolidation

An Executive Brief

October 2006

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Executive Summary

All aspects of a service provider's business are represented by data. Customers, network assets, offered services, billing, and other business functions use, create, and store data. From this perspective, it is the <u>data</u> stored in an OSS/BSS application, not the <u>functions</u> within the application, that are the most important. **A service provider's data <u>is</u> its business,** and must be current, reliable, and accurate. This will become much more significant in the coming months as data associated with certain OSS/BSS (e.g. billing, user-defined call processing information, customer presence, and availability) evolves into part of the service offering rather than just support of such offerings as is the case today.

The role of OSS/BSS data as the lifeblood of a service provider is now recognized at an executive level. There, the importance of eliminating functionality silos and making data more globally accessible (including in some cases outside the firewall to other service providers) is increasingly important for competitive advantage.

This executive brief explores a specific aspect of telecom information management, namely data migration. A brief discussion of the importance of service provider data strategies for ongoing operations is followed by specific considerations and examples illustrating the success of data migration projects. As a source of proven experiences in this area we describe IBM®'s data migration offerings for telecom service providers, which it defines as a series of five functions each including both software and consulting methodology. Additionally, IBM offers its professional services teams with several years of experience in addressing data problems from a number of market sectors both inside and outside of the telecom environment.

Addressing the data migration issue now, at the dawn of an age where data is retrieved, analyzed, and compared to current conditions as part of a "new wave" of real-time based services, will clearly separate those organizations that will attract and retain the highest-paying customers from those that do not.

Data-Centric Operations – The Need for Change

Communication Service Providers (CSPs) vary in both size and type. From traditional facilities-based PSTN carriers and cable operators, to today's "facilities-less" Mobile Virtual Network Operators (MVNO), all have one thing in common. They provide telecommunications services to their customers. The business for delivering these services is represented by data including that associated with customers, network assets, service definitions, and partner relationships. Data within the myriad of systems addressing the business needs in these areas truly define a CSP's business. As such, the data must be current, reliable, easily accessible, and accurate.

Shown in Figure 1 below, every OSS/BSS function includes a significant data component. Each one receives data, acts on it, and either retains the information or passes it to another system. A trusted data source of record and a continuous flow of "good" data through these systems is the key to flow-through operations, OSS/BSS integration, and business transformation. A focus on data and information architectures that cross multiple OSS/BSS functions is particularly important as CSPs seek to support multiple services over multiple network technologies and to provide a seamless service view of critical information to their customers.

Figure 1: Telecom Data is a Large Component of Most OSS Functions
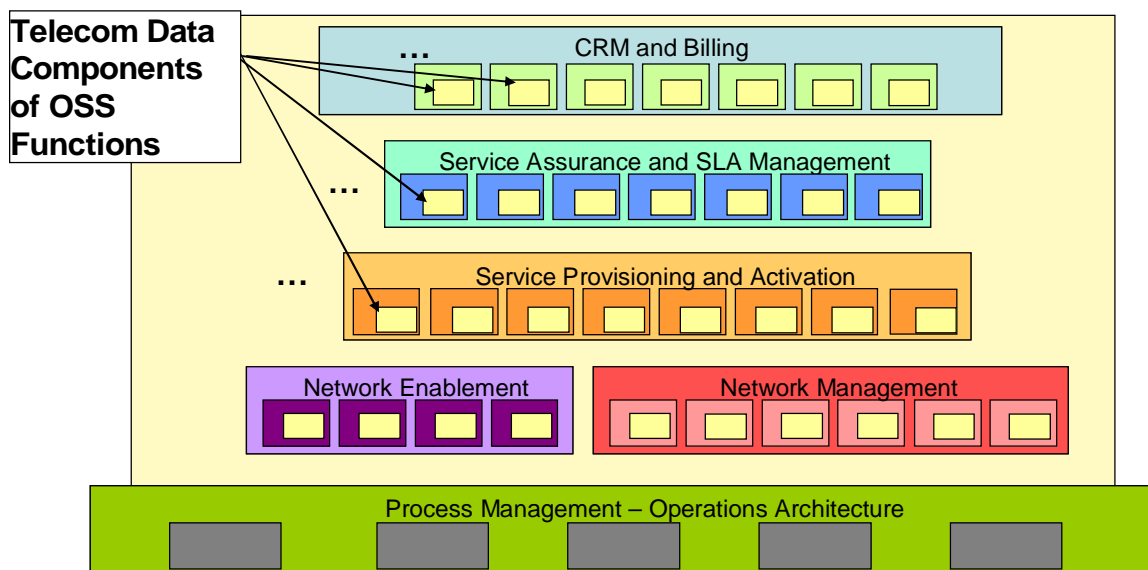
Source: Stratecast Partners

As the telecommunications industry changes to accommodate an emerging IP infrastructure, increased competition, and multiple service offerings, so must the OSS/BSS environment transform to address new business requirements. Instead of thinking about OSS/BSS in the functional units shown in Figure 1, the growing importance of data to many organizations today means that service providers are now organizing around data or information architectures. As more advanced services evolve to take advantage of the new capabilities that both network and computing technology can offer, especially those involving real-time billing for content management, presence, availability, and call control, data migration[1] has become an increasingly important priority spawned by a variety of business needs including:

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[1] In this report, "data migration" refers to the process of transforming data representing customers, products, assets, usage or other telecom information from one or more systems to be used in a new OSS/BSS deployment.

- **Industry Consolidation.** Service provider mergers and acquisitions result in a single carrier with disparate data stores from formerly separate companies. These must be consolidated.

- **Information Sharing.** Many OSS functional areas share the same information. Duplicating this information across functional silos promotes errors, produces inconsistencies in customer interactions, and breeds inefficiencies around maintaining multiple data sources since each is viewed as "essential" by the teams that are dependent on this data for addressing the needs of their work functions.

- **Single Customer View.** Many operators are moving towards a single customer view of both subscription and service-level information. A long time "holy grail" of the telecom industry but difficult to obtain because of legacy data consolidation problems, single customer views are becoming a reality due to their necessity in facilitating sales, marketing, service provisioning, and customer care functions in an increasingly competitive environment. To address these needs, data must be consolidated and augmented with new information to deliver a "single customer view" to the people that need it the most—customer support.

  Though not likely to happen in a flash since the single customer view involves data from so many systems, the network itself, and sources including old paper diagrams, local electronic databases, and spreadsheets; it is happening as a means for some service providers to differentiate and stay in the "customer spotlight". In view of today's business realities, though data is the lifeblood of a service provider and migration efforts are increasingly important, data migration is often viewed as s technical detail, playing second fiddle to the most salient and actively marketed features of a new OSS or BSS system designed to address a unique network technology or service need. The turning point in this thinking rests with the dependencies of these new systems on a consolidated view of customer information to address the new generation of real-time based customer service offerings. Without a single customer view, such offerings will fail to reach critical mass. The future of any organization unable to innovate and provide new services will then be in doubt.

- **Real-Time Data Analysis.** Real-time (as opposed to batch) data analysis is an essential part of some new services. Rapid data processing is needed for IMS, new service deployment, interactive usage, and some aspects of network management. An efficient, consolidated data backbone is increasingly critical.

- **Accurate Data.** An OSS or BSS application is only as good as the data upon which it depends. Expensive OSS/BSS implementations fail when data errors, duplicated data, or lost data problems are not addressed during migration.

- **Efficiency Improvement.** Utilizing Data Integration software and services will produce considerable efficiency gains. If data is represented at a high level of abstraction, then similarly abstract functions can be written to access this data for any OSS/BSS functional area. For instance, an abstract method might be to create, retrieve, update, delete, print, transfer, compare, or merge information. From one OSS/BSS functional area to the next, the format changes but the operations are the same.

  Considering the magnitude of the data repositories of most CSPs, it will likely take years for a large group of both IT and business specialists to properly understand, cleanse, and match the duplicate data found at most organizations. In some cases, commercial solutions have shown efficiency improvements from 50% to as high as 90%. **In short, data migration**

can and should be done with a standardized set of tools that includes both software and professional services personnel experienced in a data migration methodology.

- **New Service Capabilities.** If data is stored in a standardized manner, then operations on that data can also be standardized. As new services are defined within next generation and traditional networks, they must draw on common data sources for several different business needs relating to service fulfillment, customer interaction, network inventory, services planning, marketing, and product/service management. Data must be migrated from an array of both old and new systems to address these common information needs. Addressing the issue of migrating to a data-centric strategy now, at the dawn of an age where data is retrieved, analyzed, and compared to current conditions as part of a "new wave" of real-time based services, will clearly separate those organizations that will attract and retain the highest-paying customers from those that do not.

- **Object Oriented OSS/BSS.** The shift in perspective from a functionally focused view of software systems to an object-oriented view has been at the root of considerable improvements in software engineering over the last five years. These improvements are as applicable to the telecom OSS/BSS sector as they are to all other data domains[2].

Stating that a data-centric approach to operations support is important to the organization and making it a key objective of any IT department is a good first step. Achieving the desired results, however, requires dedication to the end goal, time, and the right resources (systems and services). Additionally, proven processes for transforming data contained in siloed systems to an information architecture capable of supplying customer, product, usage, and other business-specific information, is critical to the success of any project and ultimately the organization involved.

For instance, a legacy system may represent subscriber names as a single field, e.g. "John Smith". The new system might represent the same information as a first name field containing "John" and a surname field containing "Smith". Various tools combined with professional services personnel expert in data migration should be strongly considered. Often what appears to be a simple work step can quickly escalate into a complicated process due to a variety of factors including: missing data, corrupt data, inconsistent data, and data that must be reconciled from multiple sources.

In another example, some North American carriers reference their network equipment by an 8-digit or 11-digit code reflecting its physical location. Problems occur when some systems reference the 8-digit code while other systems use the 11-digit code for the same item. Even more frustrating is that these codes are generally used to define a physical location rather than the specific type of equipment; hence one code can have reference to several different equipment items depending on what system is using the data.

There is a greater degree of executive level awareness today around the need to carefully migrate data to obtain better cost efficiencies and also to eliminate silos of functionality. There is also an increased focus on making data accessible to those that need it, both inside and outside of a company's firewall, via new computing capabilities such as web services. **Most importantly, underlying every system transformation effort is a considerable data migration project, the cost of which can significantly exceed the price paid for an OSS/BSS software license by several times if such projects are not implemented carefully and with the right business objectives. Stratecast believes that vendors such as IBM, providing both software tools and**

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[2] Stratecast report "SPIE 2006-35 OO for OSS/BSS: Rethinking All of OSS/BSS from an Object Oriented Perspective to Support Service Provider Strategic Priorities"

professional services personnel experienced in data migration, should be considered strongly as a solid and reliable approach to addressing all data migration projects.

Practical Considerations in OSS/BSS Data Migration

A number of practical considerations apply to any data migration effort. Data migration solutions involve software assets, best practices "process templates" developed from repeated data migration projects both inside and outside of the telecom environment, and experienced resources. Due to the complexity of most data migration projects, some vendors only focus on a part of the solution rather than an end-to-end process.

For a project to be successful, however, the full data migration process must be addressed. For example, IBM defines the data migration process around five key functions associated with its data migration solution—IBM Information Server—as shown in Figure 2 below. This solution includes both software and professional services personnel with data migration experience associated with connecting to the data sources involved, understanding the data relationships, data cleansing, data transformation, and making the migrated data available to all concerned.

Figure 2 – IBM Information Server
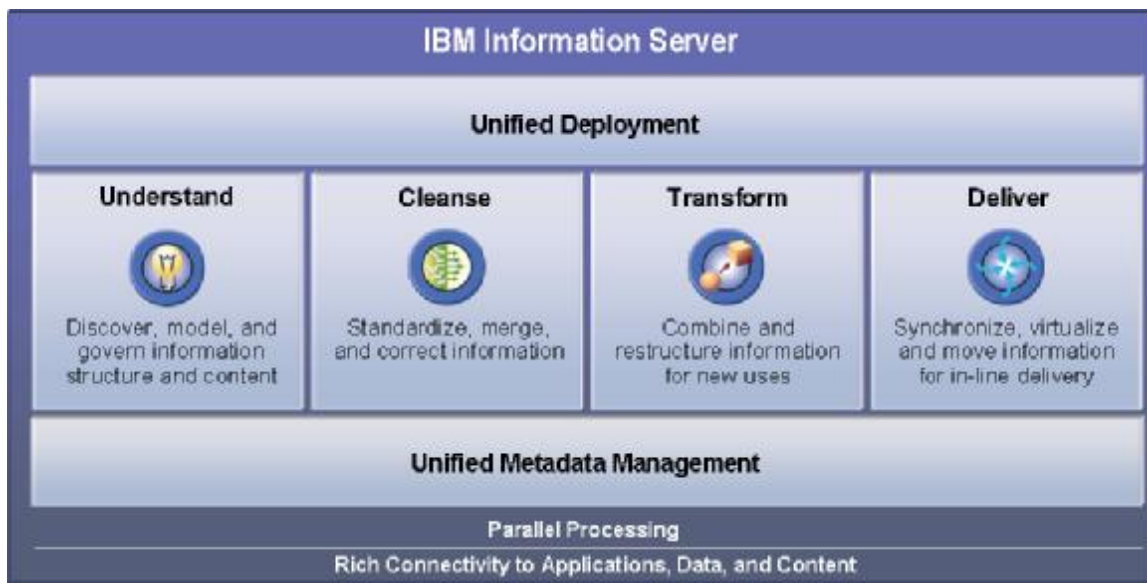
Source: IBM

When engaging in any type of data migration project, a number of factors should be considered including:

§ WHO DOES THE WORK? Telecom data migration can be done in-house or outsourced to a vendor or systems integrator. If done in-house, data migration is often left to a group expert with a specific data type with little or no expertise involving the logistical aspects of data migration or the data needs of other work groups.

Stratecast believes that to minimize project completion times and to minimize risk, vendor solutions should be strongly considered. Vendor supplier capabilities often prove to be the

least disruptive and are often the most economical when considering the time involved for project completion. Vendor solutions are usually delivered with pre-written APIs to common data sources and involve trained resources expert in data migration methods.

IBM told Stratecast that it helped a large North American service provider reduce the number of billing systems it was using for a particular business need from eight systems to one. Data processing times improved from several days to a few hours. This project was completed in significantly less time than would have been done with internal resources due to other business demands for the IT group's time, the data migration level of expertise IBM brought to this project, and IBM's proven data migration software tools.

§ **WHAT TOOLS ARE USED?** Data might be migrated using a specialized migration platform/framework, custom-built scripts, a GUI tool, or Excel spreadsheet. Although such capabilities are commercially available and have been used successfully for telecom data migration tasks in the past, CSPs should avoid the mistake of overlooking telecom data-specific migration offerings, since building APIs to common data sources using more generic tools designed for multiple industries can increase the time required to complete a data transformation project. In the same light, commercial tools can significantly decrease the time needed for the data migration process by applying pre-defined templates and "rules-based discovery engines" that can troll through mounds of data looking for user-defined patterns much more effectively than manual methods.

Stratecast believes that significant efficiencies are gained by using commercial data migration solutions such as the IBM Information Server especially when data migration needs are complex, involve large data volumes, and/or incorporate information from multiple systems. For example, such mechanized solutions are able to sift through large volumes of data records to discover "similar" data fields between systems. A critical product module of IBM WebSphere® Information Server, dedicated specifically to the data discovery function, is IBM Information Analyzer. Once the desired information is identified, final decisions can be made about transforming discovered data relationships for use in other systems or processes.

§ **WILL THE DATA NEED CLEANSING AND STANDARDIZATION?** Data migration isn't just about moving information from the source to the destination. Other factors include data quality, data governance, and most importantly, cleaning up discrepancies with the same data defined in two different systems. Due to the large volumes of data that are often involved in migrating legacy telecom systems, proven commercial solutions are often the best answer. For example, another major product module of IBM Information Server is its data cleansing tool called IBM WebSphere QualityStage. This tool helps to identify and resolve a number of issues including:

  o *Free-form Text Investigation* – Allows users to recognize and parse out individual fields of data from free-form text

  o *Standardization* – Allows individual fields to be made uniform according to user-specific standards

  o *Address verification and correction* – Uses postal information to standardize, validate, and enrich address data

  o *Matching* – Allows duplicates to be removed from individual sources, and common records across sources to be identified and linked

- o *Survivorship* – Allows the best data from across different systems to be merged into a consolidated record.

IBM WebSphere QualityStage can match data from different records, even when these records appear very different. The design of matching rules is important, since it determines which records will be brought together. These match rules are designed using a visual, business-centric interface, which allows instant feedback on any changes thereby allowing fine tuning without significant work effort.

§ HOW MUCH OF THE EFFORT IS MANUAL? Automated tools can only go so far, since manual inspection of data inconsistencies and assistance from subject matter experts are often required to determine the exact conditions of preexisting data records and to validate the migration rules. Satisfying this need requires a joint effort from both the vendor-supplied data migration team and internal resources.

Stratecast believes that a seasoned vendor team can significantly minimize the time involvement of customer-provided subject matter experts, as these resources are often over-committed to numerous projects and are generally knowledgeable on only a limited number of data fields within the scope of a project. Using vendor-supplied software tools crafted specifically for the data migration process, combined with knowledgeable resources, most data relationships can be identified. In many cases, business rules for managing specific relationships must also be defined since these relationships may not be intuitively understood by all parties that will eventually use the new data following the migration process. For example, multiple systems may maintain tables of customer information; however, the business may uncover a requirement for the concept of a "high-value" customer. The business needs a way to define what a high value customer is, and how to recognize them such as "a high-value customer is a customer with combined account balances over $10K".

To satisfy these business needs, IBM Information Server contains a data discovery engine (WebSphere Information Analyzer) and a data definition dictionary (IBM WebSphere Business Glossary). Both of these tools have proven track records for meeting the needs of data identification and definition. Both are associated with IBM's "understanding" phase of the data migration process.

§ HOW QUICKLY CAN THE DATA BE MIGRATED? In a "flash cut" migration, all data is moved to a new system overnight and the old system becomes unusable. In contrast, for business critical systems such as billing or customer care, CSPs generally choose to maintain both the old and new systems running in parallel for a time: one using old and the other using the transformed data, while the data is transformed in batch. Although it mitigates risk, the second approach requires two systems to be operated in parallel, sometimes duplicating data (and costs) and creating additional migration headaches.

The ultimate determining factors for any data migration project include: the amount of data involved, its criticality to the business, number of contributing systems, and degree to which the data must be "cleansed." Stratecast believes that vendor-supplied solutions (software and experienced resources) are often the most qualified to successfully complete a data migration project in the least amount of time. This is especially true based on the number of unknowns associated with data discovery, data reconciliation, and data mapping. In general, however, the most business-critical migration projects are the most likely to need assistance from data migration professional services coupled with the tools a data migration

vendor can bring e.g. proven capabilities for handling both complex data discovery/mapping needs and high data volumes.

According to IBM, it implemented a solution for one of its large service provider customers that allowed this carrier's customer data analysts to satisfy several types of analysis requests each within a six hour segment. This was a significant improvement over what was normally taking three weeks to complete per request. The difference came from improvements to the data access process thereby freeing the analysts to do analysis activities rather than hunting for data, managing data, and formatting data into a usable structure before analysis could begin. This data migration and management project was accomplished within eight weeks from start to finish.

§ WHAT ARE THE DATA SOURCES FOR THE MIGRATION? A migration effort may involve transferring data from an existing single system to a new single system, existing single system to multiple other systems (hopefully a rare occurrence), or it may end up consolidating multiple data sources into one. As previously discussed, even the simplest data migration projects on the surface look straightforward, however, as the project evolves several roadblocks often emerge. The most common of these is associated with data protected inside carrier fiefdoms. When this occurs, executive sponsorship is often needed to emphasize the value of cooperation with the migration effort. Data may in fact reside on physically separate systems from acquired companies or consolidated operational groups that have never been integrated.

Stratecast believes that vendor solutions are particularly important for addressing this business need, as they can bring the accumulated experiences from other projects to light on the many positive business benefits that are achievable from most data migration projects. IBM for example, brings a seasoned professional services team to each data migration project it handles. According to IBM, these resources are well versed in its own data migration products and experienced in the functional specifices of the involved project (e.g. billing, customer care, and inventory).

§ WHAT ARE THE KEY PHASES TO THE DATA MIGRATION PROCESS? A number of consulting firms and vendors offer data migration process templates. These may simply establish basic processes for migration, or may include software assets that aid in the migration process. Typical steps include:

- o *Data Extraction and Metadata Capture from Sources.* Select data fields are copied from the source systems and the metadata repository is populated with source system information about the data.

- o *Data Assessment and Profiling.* Analysis of the content, structure and quality of data from the source systems.

- o *Data Cleansing.* Discrepancies and errors in source data are resolved.

- o *Data Mapping and Alignment.* Matching source to target data fields and resolving any semantic differences. Metadata repository is updated with target fields and the source to target mapping.

- o *Data Harmonization and Conversion.* Consolidating source system data, applying standardization, cross-reference, augmentation rules, and survivorship of matching records.

o   *Data Validation.* Confirmation that the extracted and cleansed data is providing the expected results.

o   *A Test Migration.* Sample data is migrated to iron out any problems in the migration process.

o   *Data Load.* Moving the transformed data into the new system.

The underlying principles driving the IBM Information Server offering are its process templates for guiding its 5-step "Connect – Understand – Cleanse – Transform – Deliver" data migration solution approach. These steps address each of the above-mentioned process stages.

The IBM Data Migration Methodology

Central to any commercial solution offering designed to address the complexities of data integration and/or migration projects, is a proven approach (methodology) for addressing both business and technical needs. Such methodologies must involve software assets and professional services personnel with experience in understanding the steps involving migration of data from one system to another, and the business acumen to work with the beneficiaries of such projects be they billing, customer care or network operations personnel.

IBM stresses that its methodology surrounding the IBM Information Server solution is a major differentiator because the company addresses the end-to-end data migration problem, not just a stage such as data discovery, data cleansing, or data mapping that is sometimes the focal point of some of its competitor's solutions. As shown in Figure 3 below, the IBM Information Server methodology involves several phases including capability assessment, project formation, data assessment, data alignment, data harmonization, data integrity, and evaluation.

Figure 3 – IBM Information Server Methodology
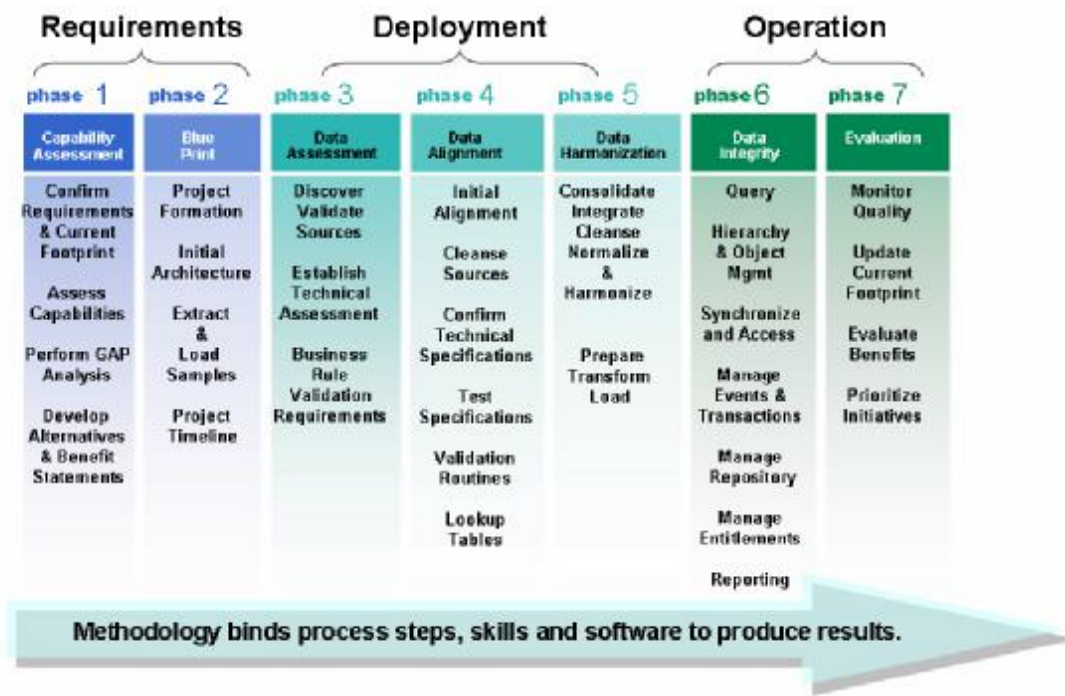
Source: IBM

Stratecast believes that any project involving complex data interactions and systems/process changes should strongly consider involvement from outside help for a variety of business reasons; the most important of which centers on end-to-end project continuity across multiple work teams e.g. billing group, customer care group, and customer support group. Service providers have multiple work teams with deep understanding of the data and processes used to support their specific work functions, but generally lack dedicated IT expertise with proven successes in consolidating multiple systems and data depositories. As a result, home-grown approaches often are costly, overrun time commitments, and fail to achieve the desired results.

The IBM Information Server Architecture

IBM defines the data migration (including data cleansing) process around a number of functions each supported via a unified infrastructure to facilitate a shared understanding across business and technical domains. Each of the data migration functions consists of a software asset that IBM offers its customers and also a methodology that governs how the software is used. IBM further offers the expertise of its professional services teams, which are experienced with data migration projects both inside and outside of telecom.

Stratecast believes that support for the end-to-end data migration process through solutions involving software products and professional services such as the IBM Information Server offering, is the right approach towards addressing the ever-increasing data migration problems that have plagued the telecom industry for decades.

As shown in Figure 4, IBM Information Server consists of five parts:

- § **Common Connectivity** to any data or content source, wherever it resides

- § **A Unified Parallel Processing Infrastructure for**:

  - o *Understanding* and analyzing the data including its meanings, relationships, and lineage. This includes three software assets: IBM WebSphere Information Analyzer, IBM WebSphere Business Glossary, and IBM Rational Data Architect.

  - o *Cleansing* the data to assure quality and consistency. It includes the IBM WebSphere QualityStage product.

  - o *Transforming* the data to provide enriched and tailored information (data transformation and movement). This includes the IBM WebSphere DataStage product.

  - o *Federating* the transformed data to make it accessible to people, processes, and applications. This includes the IBM WebSphere Federation Server.

- § **Unified Metadata Infrastructure** to facilitate the shared persistent understanding and standardization of the source and target data across both business and technical domains. This includes IBM WebSphere Metadata Server and IBM WebSphere Business Glossary.

- § **Common Services** that centralize core tasks such as security, user administration, logging, and reporting in addition to allowing cleansing and transformation rules or federated queries to be published as shared services. The product module that performs these functions is IBM WebSphere Information Services Director.

§ **Unified User Interface** to make it easy for development teams to design information integration logic across functions. The user interface is segmented across analysis, development, and administrative activities.

Figure 4: IBM Information Server Architecture
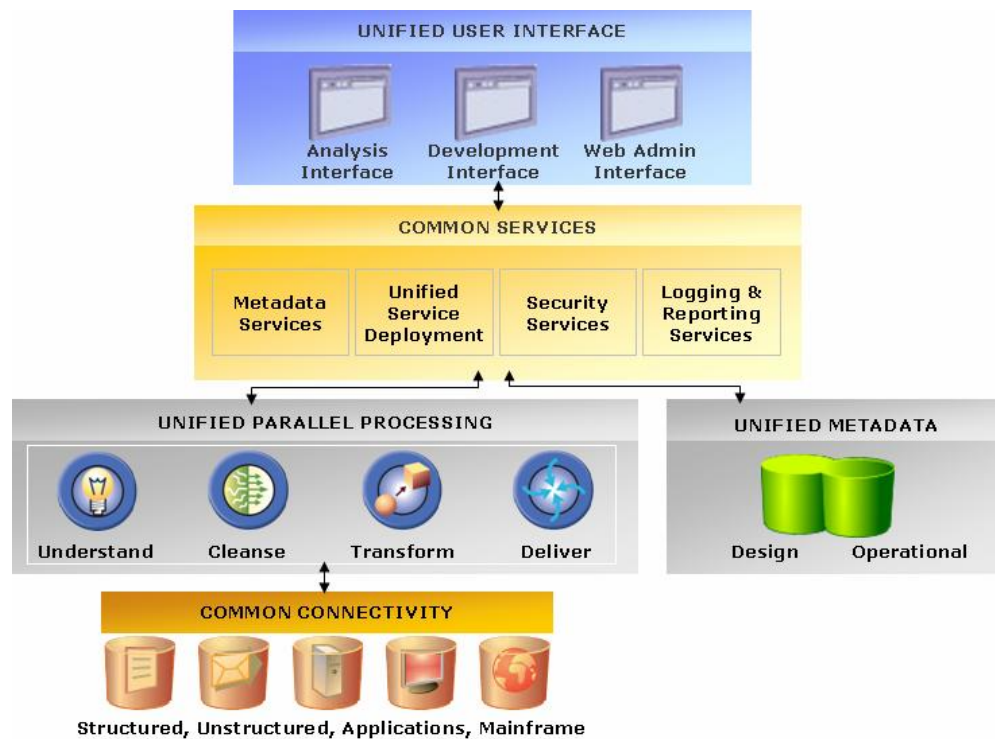
A Case Study – Large Asia/Pacific Service Provider

A very high priority at any CSP is its need to constantly improve its customer support processes, especially analysis of the data pertaining to customer buying patterns, service complaints, monthly average spend on services, and customer turnover. One of IBM's Asia/Pacific service provider customers developed its customer support analytics organically, which were geared towards addressing the business needs of each individual business unit with no real thought towards standardization or long-term data management. At a corporate level this service provider found several major problems including:

§ **Use of Department-Based "Silo" Functions.** Required data and analytical models were independently developed by multiple departmental work teams and occasionally by different people within the same work team. This was often done on a calendar-specific basis such that different models analyzed the same data at different points in time. While acceptable for the short term, changing business policies and needs meant a process that worked earlier may not work the same way the next time around. Making changes to both the processes and especially the models was often awkward, time consuming, and nearly impossible to stay synchronized with the models defined by other work teams.

§ **Wasted Work Effort.** With multiple departments developing analysis models independently; the same work was done over and over with little chance for reusability.

§ **Lack of Standardized Processes.** Lack of a standardized approach meant that comparing model results between departments (if it were ever necessary) would likely show various levels of discrepancy. The potential for a huge data inconsistency problem was significant due to different data sources, different business rules for manipulating the data, different storage methods, and little to no re-usability of analytical models between work teams.

§ **Analyst Time for Analyzing Data.** With a complete lack of managing the data processes and analytical models consistently between work teams, it was found that the largest part of a department analyst's time was spent working through issues around acquiring the right data, cleansing the data, and maintaining the data in a way that could be accessed again.

Working with this large carrier, IBM developed a standardized analytical solution that incorporated data from each of the systems this carrier was using to address its customer support analysis process. These included several BSS systems such as sales/marketing, customer care, customer support (trouble management), billing and churn analysis. This initiative strategically incorporated existing environments and projects for enabling a realistic tactical approach toward migrating from what was "being done", to what "needed to be done."

Through a data storage enterprise environment, this customer was able to access all analytical data in a single IT-supported work-space, enabling it to create single service, account and customer views of the most critical customer analysis patterns. The key benefit from this project resulted in a reduction of the time needed to complete a data analysis "pass" from 3 weeks to 6 hours. The project found more than 0.5 million duplicated customer records that were receiving duplicate mailings. This improvement along with the increased accuracy of customer relationships amounted to a $4M annual savings.

The Last Word

As the telecommunications industry continues to undergo massive transition from technology evolution such as IP and IMS; from mergers and acquisitions; and from the shift to a multi-service environment; the success or failure of a data migration effort is paramount to competitive differentiation and long-term success. A service providers' ability to respond quickly and efficiently to customer demand and to address new opportunities in a cost-effective and thus profitable manner depends on the capabilities of its OSS/BSS environment including its business processes. These OSS/BSS systems are, however, only as good as the quality of the data upon which they depend.

Despite this reality, telecommunications vendors, service providers, and systems integrators continue to under-emphasize the importance of a data migration effort in determining the success of OSS/BSS consolidation or deployment projects. This is especially problematic given the magnitude of the risk, cost, and time involved in a typical migration project.

There are numerous tools, practices, and strategies that have been proven in other industries and that can be readily applied to telecom. That said, however, it is important to recognize that although there is a considerable body of expertise around data migration in the IT community, there are specific considerations that telcos must keep in mind, given the complexity and inconsistency of legacy systems, the need for rapid and cost-effective migration, and the dependency on accurate data for successful operations.

There is no question that data migration is always a complicated, time consuming, and expensive task. There is also no question that a well-executed data migration effort will ensure that OSS/BSS transformation projects will pay immediate and significant dividends in terms of improved operational efficiencies, competitive agility, customer satisfaction and, ultimately, financial performance. For these reasons, migration efforts must receive a higher profile, and must be carefully planned and managed in the future. Service providers cannot and should not avoid the data migration "monster under the bed" any longer.

Fortunately, vendors such as IBM are now offering prepackaged telecom data migration and cleansing tools with professional services personnel that have significant experience in addressing such problems. IBM Information Server is an industry-proven data migration and cleansing solution—methodology, software tools, and professional services. Clean and reliable data is the pathway to successful implementation of real-time services — the sweet spot of customer retention and loyalty.
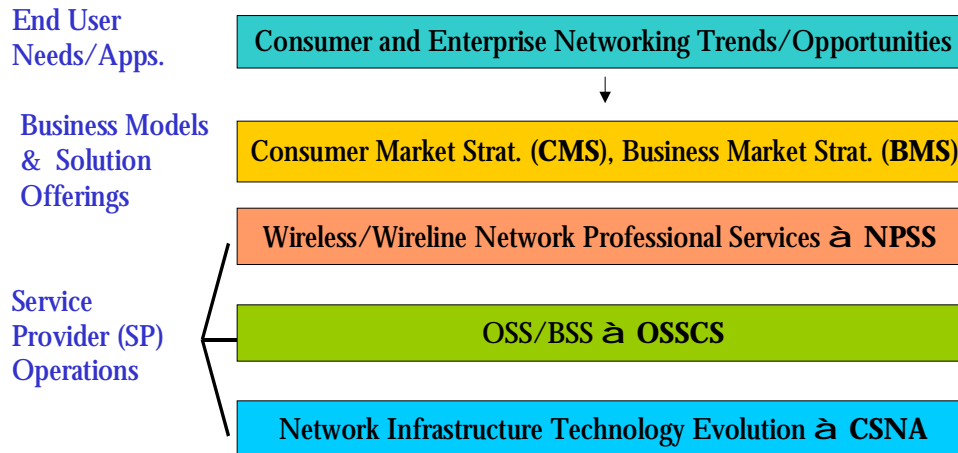
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