PROGRAM REPORT:

"Enterprise IT Architecture Assessment, Migration Strategy and Integration Plan"

Prepared for:
"Client"

Version 5.0

Document Revision History

The information contained in this document is current as of the end of the assessment phase of the project.

Revision Number	Revision Date	Summary of Changes
1.0		Testing Strategy & Risk Management update
2.0		IT Environments Overview update
3.0		Implementation Plans update
4.0		Business Services Overview update
5.0		Business Divisions Overview update

Distribution

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1 EXECUTIVE SUMMARY

The ability of keeping corporate Enterprise Information Technology Architecture, relevant hardware- and software platforms, applications and networks up to date and capable to address expanding business requirements is critical to most businesses and their IT organizations.

In accordance with adopted by the Client approach and Corporate IT Strategy, the IT Assessment, Analysis and New Platform Migration Program started with the phase one – IT Assessment and Strategy. It included updating the Corporate IT Strategy, issues awareness, tasking, problem determination, inventory and assessment. The primary objective of the Assessment and Strategy Project was to assist Corporate Office and Business Divisions (BD) in determining the Migration readiness, outline the exposures, vulnerabilities and recommendations that are necessary to prepare for transition to the new IT environment in both timely and cost-effective fashion.

The scope of the Program included inventory and assessment of IT and End User PC environments, Embedded Systems, Telecommunications and Facilities. This Report represents only results of the work done on the Client's IT and End User environments.

For the Client and its BD's, the corporate IT migration problem was a serious one since an essential part of their IT and end-user applications required renovation and upgrades**.** Impacting systems and applications, the problem affected customers, employees and vendors. Resolving the problem Client has launched the Program as a major initiative and has established a Corporate Project Office, as well as project teams at each BD to identify and address the migration issues.

Costs

Based on the Project analysis, an estimated total cost of the conversion projects, to achieve Migration readiness (including of hardware, software and X person years of effort) are represented in the following table:

Business Division	Effort, Hr	Cost, $Mln
TOTAL		

2 MIGRATION SOLUTIONS AND STRATEGY

2.1 Program Overview

New platform IT system compliance can be defined as 'Migration Readiness', i.e. a system function continues to work correctly after the Migration.

The Client Program work started with the development of the Corporate Project Office, project standards, guidelines and templates to be used in capturing the inventory for Client BD's. The inventory was captured utilizing individual logs (spreadsheets) for:

- Operating Software
- Databases
- IT Applications
- PC and Shrink- wrapped Applications
- PCs and Hardware including purchased / vendor products.

An Oracle database was developed, as the repository for the IT , End User and Embedded Systems Inventory.

The Contractor project teams assigned to the Program assisted the BD's in completing the assessment phase, "IT Migration Methodology". Additional survey information was gathered through the interviews with BD's IT groups. This work on the assessment was scheduled with plan to deliver an IT Environment Overview, Migration and Implementation Strategy and Plan report.

At the same time it was assumed that Subcontractor is managing the assessment for the Embedded Systems, Telecommunications and Facilities.

Perspective plans were considered to initiate analysis, remediation / fixing and testing of non-compliant and business mission critical applications. These plans were summarized as part of the assessment work. Coordinated by the Project Office the project team was able to optimize information exchange and efforts with BD's during the data gathering and analysis processes.

This Report represents these main consecutive parts:

- Executive Summary
- Corporate IT Strategy
- Solution and Strategy
- IT Environments Overview and Implementation Plans (for each of the BD's)
- Appendixes

The delivery of this Report completes the Assessment and Strategy phase of the Program work and forms the basis for commencing next phases of work: Implementation (that includes Detailed Analysis and Planning, Conversion, Testing), Migration and Clean Management.

2.2 Corporate IT Strategy

High level considerations for Corporate IT strategy and based on it Migration solution approach suppose the accepted definitions for IT Strategy, and relevant Vision, Mission and Objectives, as follows:

IT Strategy:

- ***Vision:*** to be a roadmap for corporate IT initiatives and effective, reliable and secure operations

- ***Mission:*** to ensure the alignment of IT and corporate business goals and capital expenditures

- ***Objectives:***

  - To add value to corporate objectives, business development initiatives and organizational change;

  - To optimize corporate IT infrastructure, programs and services through:

    - improving planning, IT processes and policies, outsourced service levels;
    - implementing best practices, emerging technologies and projects to enhance corporate functions and business continuity;
    - consolidation of services (email, file, messaging) and aggregation of applications into a portal framework architecture;

  - To improve utilization of IT assets through:

    - reducing operating costs, sustaining capital expenditures and improving performance metrics (capital and OMA IT spending as a percentage of revenue, per FTE, per Customer);
    - effective implementation of Enterprise Application Integration;
    - effective asset (hardware and CDS) replacement management and minimizing the cost of ownership.

This Corporate Strategy main components are reflected in the figure below:

2.3 Enterprise Architecture Integration and Migration Approach

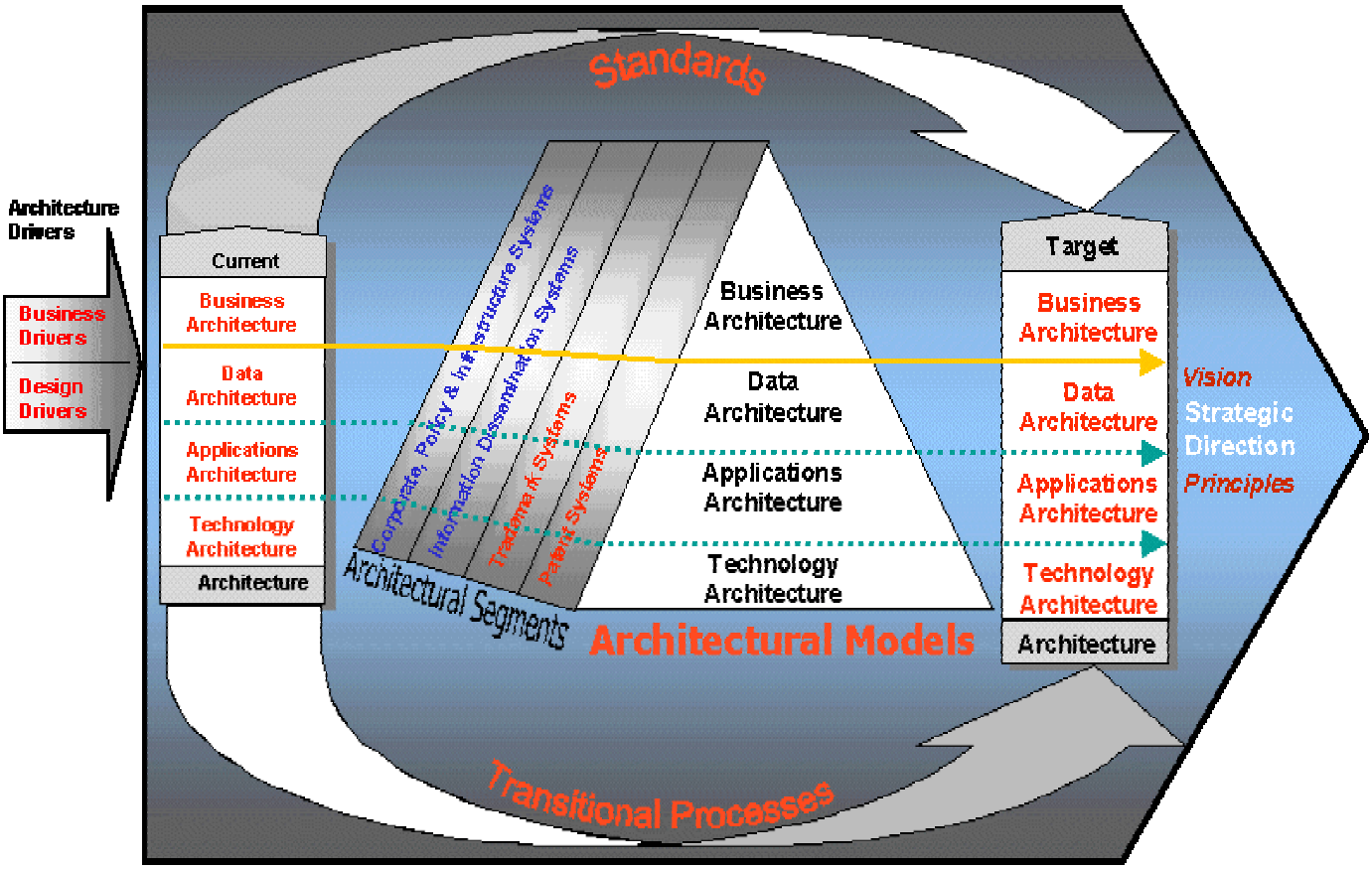
High level considerations for Migration solution approach suppose a consecutive phases schedule: Project Organization; Detailed Analysis and Planning; Remediation/ Conversion, Testing, and Implementation.

These phases consist from specific activities, tasks and steps, including detailed project scope definition, planning and work package development, identification of the type, availability, and supply of resources to support remediation, a core team defining, specifying and installing testing equipment / software and procedures, staff training, remediation / conversion of non-compliant components, testing and implementing in production. The recommended implementation strategy would also include an approach where multiple application systems will be converted concurrently and work is scheduled based on the following priorities:

- Business importance (priority) as defined by each BD
- Data sensitivity as determined in processes of surveys and interviews
- Business impact date - when the effect of Migration will begin to be felt

- Remediation work should not be coupled with other enhancements (this would increase work effort and extend the time to complete conversion work).

The Migration approach utilized in the Program is based on the accepted Enterprise Architecture Integration model as shown below:



2.2.1 Scope of Work

The work to make the corporate IT Environment Migration ready and to ensure that Client BD's business operations will not be impacted is very time-consuming and affect every area of the business. The Migration Solution and Strategy as well as Implementation Plans define the guidelines that BD's shall follow for resolving the transition issues.

The full size or more detailed migration methodology approach provides an integrated solution, or project, which represent the scope of remediation work as consisting of the main defined phases. The approach considers that Program work process begins with undertaking the first phase - Assessment and Strategy. This Final Report was created as the result of that phase completion for Client.

The next defined phases of the Program are Detailed Analysis and Planning; Remediation, Testing and Implementation. They are proposed to be completed together.

The full scale Work Breakdown Structure for Detailed Analysis and Planning, Remediation, Testing and Implementation Project, as represented in the **APPENDIX 1 "Work Breakdown Structure",** has been tailored against each BD environment (corresponding references to analysis, conversion and testing tools are included in the WBS for the cases when they are available/ applicable / appropriate. For most of the BD's the manual effort approach is practically planned).

2.2.2 Remediation Processes and Environments

For most BD's it is considered to do the remediation work implementing specific remediation processes, tools and techniques are discussed in **APPENDIX 2 "Conversion Techniques"** and **APPENDIX 3 "Bridging and Data Storage Formats".**

The remediation / conversion work environments depend on one of two possible approaches: on-site project team solution, where most work is done in an BD's IT environment, or a conversion factory solution, where the non-compliant applications are being remediated off-site at a specialized conversion environment and returned to an BD's production environment to be tested.

Since most of the appropriate work is expected to be done on-site by the available IT staff, the main issue for ongoing analysis is on the scope and capacity needed for testing, and how to best supply it. Main considerations include testing in the current environment. A dedicated environment is also recommended for testing the remediated, migration ready applications.

A shared testing environment may be used for testing all applications, implementing date simulation software tools but a dedicated test environment will be required to test mission critical applications in a real production environment.

2.2.3 Resources

Resources availability is one of the essential elements of the Program success. The main types of resources needed for performing the project are (within some BD's one person may fulfill various roles):

Business Analyst (Analysis or Testing): a BD's staff member with expert knowledge of a specific part of a business area and its applications. This person is the source of information on any detailed business function that may be impacted, test definition and verification of test results.

Project Manager: is responsible for the Project scope of work

Team Leader: is responsible for the day-to-day operation of his/her part of the Project, verifies that starting criteria are satisfied at key milestones before the project continues beyond the milestone, documents detail plans, tracks detailed project activities and provides status to the Project Manager.

Analyst: is experienced in translating a business information requirement into an IT solution, possesses specific expertise in data collection, assessment and solution design, special knowledge of date impacts on business, systems and testing requirements, as well as appropriate solution approaches to resolve date problems.

Programmer: is experienced in translating a business information requirement into an IT solution, possesses specific expertise in solution design and programming language skills, special knowledge of date impacts on IT systems as well as appropriate solution approaches to resolve data problems.

Project Manager (Testing): is responsible for all system testing work and works with Test Leaders to reach all milestones for each part of a project.

Test Leader: coordinates the entire testing process on behalf of developers and the test team, is responsible for the overall test plan and defines the test standards and procedures.

Test Analyst: identifies test objective, focus, test case design, setup test tools, scripts test procedures, quality control and version control.

Tester: prepares the test data, test cases and execute the test and reporting.

Production Control Analyst: is responsible for version control, code retrofit with system enhancements and system promotion to production environment.

2.3 Testing Strategy

The Migration testing requires an aggressive and carefully planned strategy to address the changes across the applications. Testing the modified source code and data is expected to be the most critical and resource intensive activity within the Project.

Based on the high level Solution Approach described in this report, a comprehensive test strategy will need to be developed during the Detailed Analysis phase of the Project to yield optimum resource performance and deliver quality test results.

An overall test strategy is required to ensure a standard testing platform is developed. This standard platform would require development of a test plan, test bed preparation guidelines, test management procedures, test organization, test tools, test execution guidelines and Migration ready qualifications.

A comprehensive testing plan should cover: testing of applications after upgrading system hardware and software to Migration-ready versions, testing of converted applications, testing of vendor supplied application packages.

2.3.1 Testing Process and Plan

The Migration testing objectives include: confirmation that each application functions in the same way the application functioned before migration, and no new errors were introduced as a result of the upgrades and changes, that each application handles processing correctly and the operational performance of the application is similar to performance before it was modified.

The establishment of a full life cycle quality assurance process ensures that the requirements, design, conversion method, and test plan are known and approved for each piece of work prior to the start of the conversion effort for that piece of work. At a minimum, a service request defining the work detail and effort for each unit of change should be established. This will ensure that the quality of the effort is defined, documented, and meets business acceptance requirements early in the application development process.

A key element of the overall testing approach is version control. Version control must be strictly adhered to and maintained throughout the testing process, and carried through implementation. It is anticipated that maintenance of existing systems will continue in addition to the Project. It is recommended that maintenance activities be limited to critical activities to minimize collision.

The following is a list of typical steps in the testing process / approach:

- Determination of testing strategy;
- Development of a test plan and a test schedule;
- Selection of the type of tests to be performed;
- Setting of the testing environment, test data and test libraries;
- Selection of the testing tools to be used; and
- Completion of testing documentation and reports.

Testing procedures can play an important role in providing the effectiveness of the testing strategy. They can be classified as follows:

- finalize test organization - typically, on a small project one individual may have multiple responsibilities, however, on a large project the following generic roles may be appropriate:
- record problems
- track problems from identification to resolution
- track the progress of fixes
- prioritize problems
- close problems with approval
- store the source code (when a problem has been fixed) in the application development library
- after the problem has been signed-off, the test team is responsible for promoting the source code to the application test library
- provide testing and problem status reports

The following process can be used for executing and reporting on tests:

- execute all documented test cases according to test plan
- verify test results
- report defects, re-test the fixes

- update test documents
- report test results
- obtain sign-off as required.

The test plan is a high level "plan of attack" explaining the overall testing strategy. Its purpose is to answer such questions as:

- What will be tested?
- How will testing be performed?
- What resources will be needed and when?

The test plan should include documentation on test objective, resource requirements, test strategy, tools to be used, testing milestones, methods to be used, high level test schedule and procedures to be used. A detail plan needs to be created for each Partition and Application.

The Migration test focus is on correctness of code. This can be further refined to specify code impacted by upgrades. The identification and development of test cases needs to create a minimum number of test conditions that will validate this specification. Destructive testing should also be accomplished to ensure reliability of code. A review of potential sources of test data would include existing production files and data from previous testing.

The following ***types of tests*** should be performed:

- ***Baseline testing*** : generate test results with current programs and data for future comparison.
- ***Unit testing*** : test individual programs and common routines
- ***System/Integration testing*** : ensure that applications work as expected
- ***Business Acceptance testing*** : confirm business user requirements to expected results.

The following table can be considered as a guideline describing test levels / types used in the Migration testing strategy:

Test Level	Test Type	Description
Baseline (System)	Regression	The purpose of this test is to generate baseline scripts and test results that will be used for comparison against converted module test results to prove that the code changes have not negatively impacted functionality. Test also ensures completeness of source code in application before remediation begins. Business expertise in generating the initial scripts and verifying the expected results is required. This test verifies that an application is working as expected, the test environment contains all the facilities required to execute the application and the results of the test are as expected. The output from this test will be used as a baseline to verify that the converted code functions the

		same as prior to changes and no new errors are introduced as a result of the changes. This testing can be executed in parallel with the commencement of the migration source code changes.
Unit	Unit	The purpose of a unit test is to ensure that the newly created programs function according to the program specifications (for bridge/data conversion programs) and to ensure that the data modifications do not adversely affect the business functionality (for common modules). A unit test detects code errors at the module level. The detail code changes will provide information for the creation of test data. The test cases developed may be reviewed by a test walk-through and passed along for testing beyond this test level. The test cases and test data must be adequate to verify proper operation of the module.
System/ Integration (System)	Regression	The purpose of this test is to execute the baseline tests against the converted applications to ensure that the code changes have not negatively impacted the functionality. Business expertise is required to determine if the application is performing correctly or if further work is required to provide the expected results. This test verifies that a migration ready application is working as expected. This version of the application is executed using the same input used in the baseline test. Upon completion of this test the application is ready for Migration system testing.
	Migration Test	The purpose of this test is to ensure that the converted applications are able to process data as required. This test verifies that a migration application can handle the required processing. The application version that was used in Regression testing is executed here. The test bed used as input contains test cases designed to validate migration processing. Upon completion of this test the application is ready for User Acceptance testing.
User	Migration Ready	The purpose of this test is to ensure that the user functional

Acceptance (Environment)	Certification	requirements have been met. Use of the Business expertise here is required to certify acceptance. This test demonstrates to the user that their application is ready for Migration. There should be no defects found during the execution of this test. Upon completion of this test the application is ready for production implementation.

2.3.2 Test Data

Basic Migration testing requires that the system data is set to a point where migration exposures can be detected. Some system resources and functions are migration sensitive and may be activated or de-activated when the system is reset. Without careful planning, it may result in the loss of these system resources and/or functions, some of which might prove to be difficult and time consuming to recover. Following is a list of vulnerable resources / functions subject to expiration:

- User ids
- Passwords
- Data files
- Authorizations/protection
- Licenses/services
- Network access
- Automation functions (as well as unexpected activation)

Client should evaluate use of testing utilities to support shifting the data for all data processed in a uniform manner. This testing should cover processing cycles that are activated on a regular basis, such as:

- Daily
- Weekly
- Bi-weekly
- Monthly
- Quarterly
- Semi-Annual
- Annual
- Automatic archiving

2.3.3 Testing Environment

To complete testing, Migration ready *dedicated* test platforms may be required for testing mission critical applications. To simulate an operating environment with a future system data, it is necessary to create stand alone systems since the Migration system should not impact the current production and current test system. The Migration system should provide a clean platform from which to execute the applications and to ensure a stable and reliable environment.

To ensure that the commitment to testing will meet the required test schedule it is necessary to define and document the facilities (environment) requirements for hardware and software. This identification list would include:

- Test facility requirements
- Software requirements - upgrades, licenses
- Site support facilities - CPU, communication lines, servers, networks
- Special hardware, disk drives or network devices
- Special software

It is recommended to make arrangements to deal with these issues as soon as possible, taking into consideration the following areas of particular attention:

- Capacity of the current network (PC, LAN Servers)
- System software and hardware upgrades
- The readiness of development software (e.g. languages and application packages)
- Software licensing for multiple copies of software
- Separate dedicated testing environment may be required by different platform
- System performance and security issues

The test environment must duplicate all production level software and major databases for the applications being tested at one time. Overall, the development and testing environments should mirror the current production environment. All hardware and system software components should be Migration ready.

Although not addressed in depth in this document, a thorough analysis of test space, test cycles and adequate separation of data must be conducted if testing of Migration ready versions of applications and system software is to be conducted with safety.

Capacity Requirements:
The IT testing environments should have sufficient capacity to support conversion and testing volumes. However, additional considerations for data storage usage should be planned in detail for:

- New source libraries after conversion
- New versions of databases if data requires conversion
- Test files and databases
- Copies of production objects
- Consideration for number of copies of environment required (e.g. separate system testing vs. user acceptance testing areas)

2.4 Change Management

Client BD’s have to be capable of safely implementing source code changes in reasonable time frames. An evaluation of this process was made on the basis of interviews and results of IT Environment surveys provided by BD’s.

Appropriate version management and install procedures are used for the distributed application platforms in BD's' environments. In most cases users are responsible for defining the changes, documenting the test cases, are involved in the acceptance test and signing off for acceptance of changes. This process allows for high quality change but was expressed as being a possible bottle neck as the rate of change or number of changes increase with remediation. Given the large degree of change that will be involved in the remediation efforts this is a definite area of further consideration.

There is also a necessity to train the staff involved in the process for generating test data and the scripts needed to test migration readiness. It can be expected that additional staff will be required to adequately script and test changes.

In some cases there can be difficulties to generate a test bed for some client server solutions and the final test actually can occur through the production environment with the users involvement. This appears to be a risk that is due to lack of staff to develop a full testing environment. This will need to be remedied during the Migration effort.

An application expert / maintainer (a programmer analysts from the IT Group) is as a rule responsible for remediation, fixing and testing tasks and this responsibility makes the person key to the process. It may be that the number of changes required for migration readiness will be too large to handle in this manner and a different process will need to be put in place. This will be determined during the remediation process and assessed at that time. The install process is dependent upon the application, a maintainer and a user are responsible for directing the install. This is again can be a risk if an individual developer is too involved in the change then the number of changes for migration may find a bottleneck in the install process.

In some BD's cases there are IT business plans with appropriate application and system management software upgrades in consideration and migration Projects face aggressive schedules in order to complete in time. In some cases, the application conversion priorities and schedules may drive the systems management environment upgrade schedules. A prioritization must take place to execute these upgrade plans in the required order to assist the application conversion projects and ensure a ready environment. The needed system management software upgrades of the migration ready products should be considered "business-as-usual" with an accelerated schedule. There can be more software upgrades than normal, and done in a shorter period of time. It is important to handle these upgrades using n proven processes and methodologies to provide the best chance of success during this conversion.

The conversion projects appear to provide an opportunity for each BD to consider the replacement and/or discontinuance of various computing platforms or software. This would be in tune with the IT business plans in place. These plans must be exercised with discretion however due to the short timeframe allowed for the completion of the projects, and due to the complexity and potential scope of this type of decision, it may impact BD's ability to meet their application conversion deadlines. Therefore, the replacement or discontinuance of computing platforms should be governed by strategic decisions being made at the application level. Upgrading to new versions/releases can be a new software cost to BD's - in the cases when it is not included with the normal maintenance /

support contracts with the vendors. BD's will need to continue contacting the software and hardware vendors, update the information as required, and implement the plans.

2.5 Risk Management

Risks in a project of this size and complexity are considerable. Each risk requires identification and analysis, quantification and a preparation of a risk mitigation plan. The major risks identified during the assessment are presented below in three categories: Business, Estimation and Budgeting and Implementation risks.

2.5.1 Business Risks

Business risks may be very difficult to determine, but nonetheless, attempts should be made to establish the business risk of failure to successfully migrate key critical applications. These risks may range from degraded service, dissatisfied customers, through loss of revenue and loss of new services. Consideration of the impacts from incorrect external data interfaces, regulatory violations and other legal exposures should be made. These risks must be tracked and managed throughout the migration projects. Adoption of a formal Business Risk Assessment Process would help to identify, quantify and develop mitigation plans in these cases. This process may include:

- ***Establish Priorities:*** If migration and other projects are using the same skill and resource pools, contention for resources and skills may affect BD's ability to staff the remediation efforts. Priorities must be determined and staffing actions implemented accordingly. The current plan is in place to use internal resources and the Corporate Project Office expertise. Certification of the testing results will require the additional use of the business and system expertise held by internal BD's employees.

- ***Develop an Integrated Plan:*** The development of an enterprise-wide, integrated Master Plan is essential for effective coordination of multiple separate projects.

- ***Develop Migration Ready Processes:*** An overall processes has to be established for promoting remediated applications into production and ensuring that applications maintain migration readiness.

- ***Replace and Retire to Mitigate Risk:*** Planning for remediation will not be just concerned with the application and code conversion. It will also take in to account other tactics that will lower the business risk to BD's.

2.5.2 Estimation and Budgeting Risks

The assessment of Year 2000 effort is based on some key assumptions that further investigation or market conditions may alter. These risks, identified below, will need to be monitored throughout the projects to insure estimates remain on track and costs within control:

- ***External Staffing Costs:*** The rate per person hour reflects an external costing rate. These rates are continuing to increase as demand for skilled staff increases and the migration approaches. Use of external resources will be considered in estimating project costs.

- ***Application Estimates:*** Most applications have been identified in the inventories without line of code estimates.

- ***Additional Workload:*** Additional operations support resources in IT and Business Admin / Support areas will be necessary to handle problem calls, perform problem determination, and possibly problem repair. An increase in the operations support budget may be necessary as the change approaches and more of these applications hit their impact dates.

- ***Staffing Skills:*** Skill classes and roles requirements' estimations over time given can provide only a starting point for a more detailed resource/staffing plan. To fully understand potential impacts, this plan needs to be completed and analyzed.

2.5.3 Implementation Risks

Main areas of implementation risks can be described as follows:

- ***Vendor Assessment:*** The vendor assessment and surveys currently underway need to be completed to understand which applications use which vendor products and to evaluate the impact of non-readiness. Contingency plans are required for all key vendor products. It is expected that the defined body will hold the responsibility to make sure all vendors reply to the survey and adequate plans are in place to mitigate any risk.

- ***IT Applications Replacement Timelines:*** Firm commitments and schedule dates for replacement projects need to be evaluated versus the related stand alone projects. In each case, a risk mitigation plan is required. The plan must consider the increasingly difficult and more costly conversion should it be delayed. The simple thought that a risk mitigation plan can be invoked at any point in time may not be correct. In addition, there may be challenging factors to be considered for the 'contingency' migration project.

- ***Timelines and Dependencies***: The use of a sophisticated network of PC's, servers and networks implies a great deal of dependencies. Failure of any single piece can delay the entire plan.

3 IT ENVIRONMENTS OVERVIEW AND IMPLEMENTATION PLANS

3.1 Remediation Recommendations

One of the main goals of the work performed in IT Environment overview and analysis for each BD was to develop the Project scheduling and costing assumptions, estimate necessary efforts and resources. Based on the results of the completed activities some of the recommended actions for initiation phases of the projects can include:

- Providing centralized project planning;
- Completing the assessment of status of vendor hardware and software components.
- Developing contingency plans for those products which status is unknown or that may not be delivered in time.
- Securing necessary IT system capacity and knowledgeable personnel resources (including contractors).
- Performing remediation work on-site, implementing mainly internal resources.

The Project work can include partitioning as an essential element of scheduling approach where a work breakdown structure is based on partitions - manageable units of work or groups of applications.

There are some other recommendations or assumptions that are further specified for each BD's, among them are:

- The cost of the Project Management Office is not included in the estimates.
- There is no estimate for support after the remediation is finished.
- There is no estimate for code / applications which were not discovered during the Assessment activities.

3.2 Business Division 1

Assessment of BD1's IT environment was conducted to identify characteristics of its current inventory. A survey was conducted with IT management participation in an effort to identify, catalogue and resolve questions regarding migration readiness of the company's software and hardware. The results of the surveys were used to develop an approach, which would determine the strategy, effort, cost and implementation plan required to ensure the applications are ready for the Migration.

The BD1's IT environment is based on client-server architecture that supports over 200 users in 15 locations / offices, employing PC platforms and LAN / WAN based telecommunications. Mostly vendor supplied application software packages are used, but there are also in-house developed applications based on 4th generation development tools. To support users and the applications they use there are about 20 servers in the current data telecommunications network. There are multiple OS being supported . The configuration represented by "intelligent" PCs attached to servers is the main one in existing technical architecture and in the company's Information Technology Business Plan. Mostly standard industry software and telecommunication products are being maintained and acquired for upgrades. The three core business systems are: Customer Interface, Geographic Information and Financial Information. Most of the application systems presently in place are considered to be adequate to support company activities through the next five years. However, there are some areas, which will require upgrades, enhancements or replacements to address key business issues that have been identified.

3.2.1 Migration Impact

All considered to be "in-scope" of Migration work applications (to be remediated and tested) were grouped into seven main partitions in accordance with date impact and business priority/criticality descending order:

1. Customer Accounting Systems (4 vendor applications and applications to be replaced by Banner project - Customer Information System);
2. Engineering Systems (Geographic Information System, Hydraulics & Node Analysis, CADD);
3. Financial / Systems (11 applications);
4. Payroll / HR Systems(4 applications);
5. Lotus Notes Systems (15 applications, all to be tested);
6. PC / Shrink-wrap Applications Systems;
7. PC Standard/Operating Software & Hardware (about 220 items)

It can be concluded from the results of the IT Environment survey and analysis that serious impact and appropriate work efforts are to be mainly identified in PC / User computing, Shrink-wrap applications and vendor products. An estimate of the migration readiness for these applications and software packages is represented in the next table:

Migration Ready	Count	Disposition
Yes	297	OK - additional testing may be performed
No	46	Require upgrade / fixing and testing
No	7	To be replaced / retired
Unknown	7	Status to be determined

3.2.2 PC / Midrange Application Profile

All existing PC / User Computing and Shrink-wrap applications were classified as belonging to 2 groups (vendor / externally supplied, in-house developed) and assessed in accordance with business criticality. Most of in-house applications are Lotus Notes, Excel, Dataflex based. Two main applications from financial area are based on Microsoft Excel spreadsheets. There are 52 PC / Midrange applications as per survey results spreadsheets. Their disposition is represented in the next table:

Ready	Count	Disposition	Business Criticality*			Developed	
			High	Medium	Low	In-house	By Vendor
Yes	34	OK - assurance testing may be performed	4	16	14	19	15
No	12	Require newer release / upgrading / fixing	4	2	4	4	8
No	2	To be replaced / retired	0	1	1	0	2
Unknown	4	Status to be determined	0	4	0	0	4

* High business criticality defined for levels 6-9, Medium - 4-5, Low - 1-3.

Appropriate disposition for Shrink-wrap applications is represented in the table below:

Ready	Count	Disposition
Yes	151	OK - assurance testing may be performed
No	4	Require newer release / upgrade / fixing
No	0	To be retired
Unknown	3	Status to be determined

3.2.3 Mainframe Legacy Outsourced IT Applications

As per results of IT Environment survey BD1 has 3 IT applications (prioritized as mission critical). They are consisting from Customer Service sub-systems and scheduled for replacement.

The following table summarizes the IT Application inventory:

APPLICATION NAME	THIRD PARTY	VENDOR	MISSION CRITICAL	COMPLIANT	DISPOSITION (FIX, RETIRE, ETC.)
Customer Services System (TSO)			Yes - 9	no	To be replaced
Customer Services System (CICSD)			Yes - 9	no	To be replaced
Customer Services System (CICSC)			Yes - 9	no	To be replaced

3.2.4 Operating Software

As per results of the IT environment inventory it includes DOS, OS/2, Windows, Unix and AIX operating software. The following table summarizes the information available on this software as follows:

Ready	Count	Disposition
Yes	106	OK - assurance testing may be performed
No	15	Require newer release / upgrade / fixing
No	1	To be retired
Unknown	0	Status to be determined

3.2.5 Databases

Existing data base disposition is represented in the following table:

Ready	Count	Disposition
Yes	6	OK - assurance testing may be performed
No	0	Require newer release / upgrade / fixing
No	1	To be retired
Unknown	0	Status to be determined

3.2.6 Vendor Products

In regard to all purchased / vendor supplied products (including embedded logic hardware), that have been identified as being active / in use, the 140 vendor product letters were sent to appropriate vendors with request to verify / confirm the state of vendor products readiness.

The following table reflects an estimated disposition of the main purchased software products (operating SW, data bases, IT applications, PC and shrink-wrap applications) as part of all those vendor products:

Ready	Count	Disposition
Yes	278	OK - assurance testing may be performed
No	42	Require newer release / upgrade / fixing
No	7	To be retired
Unknown	7	Status to be determined

An estimate of the readiness for the main hardware products (desktop / laptop PC, servers) is represented in the next table:

Ready	Count	Disposition
Yes	306	OK - additional testing may be performed
No	0	Require newer release / upgrade / fixing
No	0	To be retired
Unknown	1	Status to be determined

3.2.7 Test Environment

One of the major tasks within the remediation effort is expected to be the testing of the converted / fixed applications. During the IT Environment survey phase of the Project an assessment was undertaken through the interview of the IT management staff when the answers were obtained on appropriate questions. These answers are summarized below into the following groups describing the existing testing practice environment. That information was later used as part of the assumptions for estimations for the next phases of the Project.

Test Organization:
The IT group members perform testing. The roles and responsibilities of test participants (from IT group) documented. The resources available to work on the project are identified, there are necessary resources in IT group to support testing, they are knowledgeable on affected applications and

responsible for managing the testing process. IT group performs unit, system, user acceptance, performance testing and does not performs regression testing. There is no a regression test facility.

There is a structured test planning process in place and all test participants are familiar with this process. The guidelines to create a test plan, a test script, a test case, and test data are analyzed. There is no a formal QA process, but there is a practice of involving users in the process of baseline testing.

There is no a formal Test Repository, but there are control reports for system/ application replacements. The current repository has to be created. All affected applications has to be specified as part of test repository based on theirs business criticality. Existing IT Environment Survey spreadsheets allow to organize the test repository by application, business function etc.
The repository can be created as secure one and will contain system, user acceptance, and performance test cases as appropriate. There are no existing formal test scripts but users/owners are supposed to be involved in creation of test plans.

There is no a master test bed with secured data files. There are going to be current and complete test data provided in terms of the application release level in production and test cases defined in the test repository. There are no test beds for regression and stress tests.

Test Environment:
There are multiple platforms in the IT Environment. There are responsible members of IT group who create/manage test environments. Test environments are controlled, test environment for the project has to be established and not to be shared with other projects (except replacement solution projects when new systems to be tested).An estimate for creation of a test environment is two-three days. A created environment will be current with all applications. The migration paths are documented, appropriate procedures are partly documented.

Test Tools:
There are no test tools installed in the test environment (except application / package specific performance test tools like a tool for network analysis - “Sniffer”). The tool experts and types of required support and training are to be identified and assessed.

Test Types:
Unit testing is required for all non-compliant applications. The necessity of unit testing for every program within the application has to be defined individually. The test plan, cases and data are to be created by maintainers and users of applications. Maintainers and users are expected to perform unit testing and verify the test results. Users / owners will sign-off on the test results.

System testing is required for all non-compliant applications. The test plan, cases and data are to be created by maintainers and user applications. Maintainers and users are expected to perform system testing and verify the test results. Sign-off criteria set for system test will depend on magnitude of application changes.

Acceptance testing is similar to system test.

Performance testing necessity will depend on the magnitude of an application renovation in accordance with the remediation plan. The performance test environment and conditions are to be defined. There are no documented Service Level Agreements for existing applications.

Test Execution and Reporting:
The execution and reporting, test results review processes are to be documented. There is no a problem tracking and reporting process. There is a process for problem prioritization. Testing requires external interfaces. Install procedures are documented as per vendor supplied documentation.

All "in-scope" applications for the remediation and testing work were (preliminary) grouped into 7 main partitions in business priority/criticality descending order as it was specified in the section 3.2.1.

On of the main conclusions from existing testing environment analysis is that an estimated time for creation of the necessary test environment is going to be two to three days. A created environment is expected to be current with all applications.

3.2.8 Effort and Cost Estimate Assumptions

As per conclusions of the IT Environment survey and the interview conducted, there is going to be only limited external remediation effort associated with the BD1's particular environment where there are only 3 IT Applications and all of them are scheduled for replacement. There will be certain effort associated with defined applications /packages remediation, testing installation.

One of the main effort areas is assumed in PC / Midrange applications. Most of the appropriate work is expected to be done on-site by the available IT Group staff. That work supposes performing semi-manual reviewing, fixing and testing of all non-compliant applications and products from those two groups. That approach is based on internally available expertise and knowledge possessed by application maintainers and users, as well as adequate assistance of Corporate Project Office experts. In addition to non-compliant applications all mission critical products (belonging to levels 6-9 in accordance with developed and used risk assessment model) are going to be tested (even those claimed by vendors as ready).

One of the main assumptions includes testing in the current environment. A dedicated environment is also recommended for testing the remediated and ready applications. This recognizes that practically all of the testing effort will need to be performed in-house.

The remediation process for PC applications is expected to be accomplished by the IT Group with participation of user community. Initial expectations are that no additional resources would be involved to assist users acquire/modify, test and implement the ready versions of their applications. This effort will be coordinated from the Project Office to allow central reporting of the progress and to ensure all user applications are moved to the migration readiness.
A reduction of the total system test effort is expected to be achieved through segmentation / partitioning the applications based on business functionality and criticality.

Additional assumption would be to use an separate test facility to allow for the testing of all in-scope applications / products. Current production platforms need to be moved toward a state of readiness to support the ready and remediated applications.

Based on above considerations the work effort and cost estimate assumptions can be summarized as follows:

- The migration development resources are to come from existing application development / maintenance resources. Additional business, testing and technical support resources are to be supplied when the project schedule requires these specific skills.
- BD1 will direct the fulfillment of resource requirements.
- Since all IT applications were scheduled for replacement an estimate of their conversion cost is equal to zero.
- All "in-scope" applications for remediation and testing work were (preliminary) grouped into 7 main partitions in business priority/criticality descending order.
- In the cases when there is no work related to conversion / upgrading but only installation and testing the effort is considered as consisting from approximately 30% of the full remediation cycle effort.
- For PC / Midrange applications, where the main remediation and testing work is expected, the date impact can be expressed in the estimated number of applications / software packages to be upgraded / fixed / tested.
- Assigned resources will commit seven and a half hours per day to the project.
- It is assumed that the internal staff cost is $ 300 / day ($40 / hour).

3.2.9 Cost Estimates

Effort / Time and Cost estimate metrics based on BD1 internal assumptions are represented in the following table:

Area	Item	Count	Time per unit (hrs)	Total time	Rate	Cost
IT Applications						
	Upgrade / Testing					
	External labor					
Hardware						
	Upgrades					
PC's						
	PC Testing					
	PC Upgrade					
PC Applications						
	Analysis, Conversion, Testing					
Other Expenses						
	Contingency 40%					

3.2.10 Business Impact

There are two major BD1 business plans that will effect the ongoing implementation of the Project:

ERP Package: The implementation of this project will occur across the same time-lines the remediation is attempting to install across. This will affect when code can be installed, the sharing of external interface code for uplifting to ERP functionality and remediation efforts, as well as the scheduling of which partitions are critical for remediation. A close interaction between the ERP project group and the Project Office will be critical for successful remediation efforts to take place.

IT Business Plan and Ongoing Development: Existing IT Business Plan will govern the overall company strategic plan during the next five years. Business process will be altered to optimize the use of the IT solutions.

While each of these initiatives are going on the business as usual processes need to continue. The standard maintenance and product enhancements processes can not be discontinued. These as well will impact the schedules and work efforts that are in place for the remediation and need the same monitoring and planning disciplines applied to them as the previous two initiatives.

The challenge around the Project at BD1 will be to manage the risk containment in a very active and rapidly changing environment.

Additional Requirements:

- Client BD's dealing with BD1 through current external interfaces will be informed of the implementation schedule and also requested to provide information on changes each company may be planning as part of it's own readiness effort.
- BD1 will provide computer equipment resources (workstations, network connections, etc.) for the Project.
- BD1 will enforce strict version control of the programs and will ensure system upgrades (hardware and software) are properly synchronized with the Project plan.
- BD1 will be responsible for implementing all changes outside the scope of the Project (maintenance and other development) and ensuring these changes do not conflict with the project activities.

3.2.11 Project Plan

A high level **Detailed Analysis, Remediation, Testing and Implementation Project Plan Schedule** for BD1 is represented in **Appendix 4** and can be considered as a base for more detail project planning.

3.3 Business Division 2

3.3.1 Operating Software

3.3.2 Databases

3.3.3 IT Application Systems

3.3.4 PC Application Systems / User Computing

3.3.5 Vendor Products

3.3.6 Interfaces

3.3.7 Business Risks

3.3.8 Date Impact

3.3.9 Test Environment

3.3.10 Other Concerns

3.3.11 Effort and Cost Estimates

Area	Item	Count	Time per Unit (hrs)	Total Time	Rate	Cost
IT Applications						

***						
***						
***						
IT Hardware						
PC's						
***						
PC Shrink-wrap Applications						
PC Applications						
Other Expenses						
	Testing Analysis & Plan					
	Administrative Costs					
	Contingency of project estimates					

3.3.12 Project Plan

3.4 Business Division 3

3.4.1 Operating Software

3.4.2 Databases

3.4.3 IT Application Systems

3.4.4 PC Application Systems / User Computing

3.4.5 Vendor Products

3.4.6 Interfaces

3.4.7 Business Risks

3.4.8 Data Impact

3.4.9 Test Environment

3.4.10 Effort and Cost Estimate Assumptions

General assumptions:

1. Inventory taken as of , unless otherwise indicated.
2. The metrics used for the remediation and planning estimates is based on sizing provided by the application experts.
3. All 3rd Party Vendor software / hardware identified will be forthcoming from the supplier at the appropriate time and BD3 will then determine if and when to implement that version or where applicable to cancel its usage.
4. Alterations to the schedule may be required when further information regarding vendor product readiness / availability of migration ready releases is obtained.

Estimating and Scheduling assumptions:

1. Project contingency is included
2. The majority of remediation work will be performed on-site using primarily internal resources.
3. Creation and maintenance of Testing environments is not included, and is doubtful whether new testing environments will be required.

IT Application Environment Assumptions:

PC (desktops & laptops) Environment Assumptions:

3.4.11 Cost Estimates

3.4.12 Project Plan

3.5 Business Division 4

3.5.1 Operating Software

3.5.2 Databases

3.5.3 IT Applications Systems

3.5.4 PC Applications Systems / User Computing

3.5.5 Vendor Products

3.5.6 Interfaces

3.5.7 Business Risks

3.5.8 Data Impact

3.5.9 Test Environment

3.5.10 Effort and Cost Estimate Assumptions

3.5.11 Cost Estimates

3.5.12 Project Plan

3.6 Business Division 5

3.6.1 Data Impact

3.6.2 PC Application Systems / User Computing

3.6.3 Interfaces

3.6.4 Test Environment:

Test Organization

1. There is no defined specialized organizational unit (test group), which will participate in testing although there are project oriented units (i.e., Solutions, Customers Business Services Support), which may lend resources. The roles and responsibilities of test participants from the above group are documented. Resources available to work on the project will have to be scheduled with other projects that may also be underway.
2. Currently the formal test group consists of one person, who is involved in user acceptance testing, which includes some performance and regression testing acceptance criteria. The project teams have been responsible for demonstrating that the system meets all unit and system acceptance criteria

Test Processes

1. A formal test planning process exists in the form of guidelines and its up to each project to follow these guidelines.
2. There are guidelines to create a test plan and test cases. There are no guidelines for test data nor test scripts.
3. There is no formal QA process.

Test Repository

- There is no a formal Test Repository. Previous projects have used PACMAN to store test cases although there is no one central PACMAN and not all projects have used it in the same manner. PACMAN does not store test data, only acceptance criteria and test cases
- Not all affected applications are included in the test repository. Only those which have had an improvement project over the past 2 years, which primarily has been limited to the daily processes.
- The Test Repository is not current for processes outside of daily processes and is organized by project and therefore not complete nor consistent.
- The Test Repository is limited to user acceptance test cases.

- The Test Repository is not secure
- All test plans are suppose to be stored in IT Project Directory structure by project. Again the content of these test plans will vary by project and focus primarily on the daily processes.

Test Bed

- There is no a master test bed with secured data files, and therefore the data is also not current with the production version of the application.
- Due to the lack of a central test bed, there is no test data matching the repository available for the Project. The best source of test data for stress and regression testing is to copy data from production.

Test Environment

The test environment exists over multiple platforms. A group exists which creates and manages the test environment. This is a controlled test environment that partly exists for the Project. There should be a plan to use existing part and obtain any missing pieces. Additional capacity may be required. This test environment may be shared with other projects.

The current plan is to work other project around the Project with the assumption that it is possible to test Project modifications in parts. Test procedures are not documented to create a new test environment and no profile exists of all test environments. It takes approximately 1 month to create a new test environment. The existing test environment is not current with all applications but plans are in place for it to be.

Migration paths and procedures from test to production are mostly automated

Test Tools

There are no test tools used except for PACMAN, which is a MS Access tool for tracking test cases, results, and problems. There is a automated testing tool, including a test bed, will be replaced and there is no plans for an automated test tool replacement.

Regression Testing

There is no separate regression testing facility except for the aforementioned tool. Regression testing to date has been a manual process and is the responsibility of each project team.

Test Levels:

For all testing levels, it has been up to each project to defined specifics on what levels are required, who signs off, who completes the planning and testing, etc.

Unit Testing

Was completed by the Tech Team (vendor), they created their own test cases and verified results

Sub-System Testing

Was completed by the Independent Test Group (ITG) which included Client technical resources and business resources. They defined the acceptance criteria, test cases, and verified results. Scope consisted of business functionality tests for the particular sub-system and/or module as well as ‘technical testing’ entering data and verifying results at the database level.

Integration Testing

Was completed by a separate Integration testing group after all sub-systems were signed-off. Group consisted of business resources defining test cases, data, and verifying results. Testing was done at the end-to-end level with all business functions being tested using the GUI front end and reports for verifying results.

Acceptance Testing

Made up of Sub-System Testing and Integration Testing. Previous projects have followed portions of the User Acceptance Test (UAT) Procedures. The Structured UAT process is initiated in the analysis phase; acceptance criteria are derived from the project requirements, broken down into testable components and documented in each step of the process. This process is dynamic and continues through the project life cycle. The UAT procedures are coordinated by an independent test group, free of development and business biases. UAT tasks are aligned with the projects' goals & objectives.

Stress/Performance Testing

Potential bottleneck areas were identified and stress tests were performed by the tech teams for these points. BD used a load simulator to test the communications, we also developed our own load simulator to test some of the modules. Integration Testing tested production level loads through the entire system

Test Execution & Reporting

The execution and reporting process is documented in each test case and PACMAN had been used as the tool. Same goes for the test results review process and problem tracking, and prioritizing process.

3.6.5 Effort and Cost Estimates Assumptions

3.6.6 Cost Estimates

3.6.7 Project Plan

3.7 Business Services

An assessment of the current Business Services IT environment was conducted to identify characteristics of the application inventory. A survey was conducted with IT management participation in an effort to identify, catalogue and resolve questions regarding preparedness of companies' software and hardware. The results of the surveys were used to develop an approach which would determine the strategy, effort, cost and implementation plan required to ensure the applications are ready for Migration.

The Business Services provide services, via ten service areas. Assets for the BD's and Business Services were inventoried by service area, and then allocated back to the BD's. The 10 service areas are:

1. PC Lifecycle

2. Network (Data Communications)
3. Voice & Radio
4. Remote Access Services (dialup)
5. HRMS (PeopleSoft) and Payroll (PeopleSoft interface being investigated)
6. GMS
7. SAP
8. Internet
9. Intranet
10. IT Projects (has no assets)

To support their users and the applications they use, there are about 40 servers in the current data telecommunications network. There are multiple Operating Systems being supported (various versions of UNIX, Novell, Windows and, DOS). The four major core business systems are: GMS, HRMS, GIS and SAP.

3.7.1 Operating Software

3.7.2 Databases

3.7.3 IT Applications Systems

3.7.4 PC Application Systems / User Computing

3.7.5 Vendor Products

3.7.6 Interfaces

3.7.7 Business Risks

3.7.8 Data Impact

3.7.9 Other Concerns

3.7.10 Effort and Cost Estimate Assumptions

3.7.11 Cost Estimates

3.7.12 Project Plan

4 APPENDIXES

4.1 Program Work Breakdown Structure

The list below outlines a sample of possible activities and tasks within the Project Plan:

Detailed Analysis and Planning:

Launch Detailed Analysis and Planning
- Review Assessment & Strategy Deliverables
- Confirm Project Scope, Approach and Objectives
- Review Estimates
- Conduct Team Orientation
- Review and Confirm Partitioning Approach / Solution & Work Unit Schedule

Coordinate System / Application Software and Hardware Changes
- Review Statement of Work & Establish Team
- Review Inventory Document & Vendor Readiness Responses
- Assess Hardware and Systems SW Upgrade Requirements
- Document HW & SW Impact

Plan and Establish Analysis, Remediation and Test Environments
- Analysis
  - Define Analysis Environment Requirements
  - Estimate Analysis Tools Capacity Requirements
  - Order and Install Analysis Tools
  - Conduct Analysis Tool Training
- Remediation
  - Define Remediation Environment Requirements
  - Select Conversion Software
  - Estimate Conversion Tools Capacity Requirements
  - Order & Install Conversion Tools
- Test
  - Plan Test Environment
  - Establish Test Environment

Analyze Changes
- Load Detailed Analysis Tool
- Extract source for Tool scan
- Verify source component completeness
- Coordinate / Synchronize data & source analysis
- Analyze Data and Identify Changes
- Analyze Source and Identify Changes
- Review Impact of Solution on Partitions and Bridges
- Specify Source Code Changes
- Specify Screen, Report & Form Changes
- Specify Data Conversions
- Specify Partition Bridges (if any)

Define Test Strategy
- Define Testing Requirements

- Customize Testing Methodology and Techniques
- Define Test Organization, roles and responsibilities
- Plan Test Data, case, and scripts
- Finalize Test Tool set
- Document Test Strategy
- Update Overall Project Plan

Develop Detailed Implementation Plan

- Develop Work steps and Estimates
- Define Timeframes of Implementation
- Define Implementation Resource Requirements
- Estimate Implementation Costs
- Review Costs/Benefits of Implementation
- Perform Process Management Review
- Update Overall Implementation Plan

Remediation:

Launch Implementation

- Review Detailed Analysis and Planning Deliverables
- Confirm Project Scope, Approach & Objectives
- Review and Confirm Detailed Implementation Work Plan
- Confirm Conversion Environment
- Confirm System Changes
- Conduct Team Orientation
- Conduct Team Training

Manage Source Code Changes

- Plan Project Source Code Baseline
- Establish Project Source Code Baseline
- Manage Project Source Code Baseline
- Synchronize Project Source Code Baseline

Change Source Components

- Review Source Code Conversion Sequences
- Modify Source Code
- Modify Screens, Reports, and Forms
- Compile Modified Source Code

Build Data Conversion and Bridge Programs

- Review Conversion and Bridge Specifications
- Construct / Modify Data Conversion and Bridge Programs
- Test Data Conversion and Bridge Programs

Testing:

Prepare Partition Tests

- Develop Test Beds & Test Scripts
- Evaluate Test Bed Quality
- Develop Baseline Test Results
- Develop Comparison Procedures for Testing Results

Conduct Systems & Integration Tests

- Perform Unit Testing
- Perform System Integration Test
  - Current Year Testing
  - Migration Testing
  - Current Year Performance Tests

Integrate Production Changes

- Perform Delta Analysis
- Review Delta Analysis and Schedule Changes
- Incorporate Production Changes

Conduct Acceptance Test

- Prepare for Acceptance Tests
- Execute Acceptance Tests
- Obtain Acceptance Tests Approval

Implementation:

Turnover to Production

- Develop Production Implementation Plan
- Conduct End-User Training
- Perform Technical Training
- Prepare Technical Environment
- Migrate Changes to Production
- Perform Post-Implementation Support
- Conduct Post-Implementation Review

4.2 Conversion Techniques

4.3 Bridging and Data Store Formats

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