LEGACY TRANSFORMATION

Legacy transformation is the process of modernizing an operational system to retain and extend the value of investments in that system. True legacy transformation efforts are typically large in scale and usually involve both infrastructure and application modernization. The primary benefit of legacy transformation is the value derived from quick delivery of new or improved functionality that supports business objectives and enhanced business processes.   Legacy transformation projects are frequently challenged, however, by a unique set of risks that threaten project success. This document describes some of the key considerations of legacy transformation projects, including risks and risk mitigation strategies.

1.0   BUSINESS NEED

The business need for legacy transformation may result from several conditions, including, but not limited to:
- An increasing number of legacy components become obsolete and/or unsupported by the vendor community, thus rendering the system at risk of failure due to insufficient technical support.
- System outages become more frequent due to aging and unreliable system components.
- Changes to business processes become too complex, difficult, and/or costly to implement.
- Solutions less expensive than legacy maintenance are available.

Legacy transformation projects may benefit organizations in a variety of ways:
- Reduce operational costs
- Add or enhance software functionality
- Improve system performance
- Meet evolving business needs
- Preserve legacy investments
- Minimize impacts to business operations
- Improve accessibility
- Improve system documentation

2.0   APPROACH

Undertaking a legacy transformation effort demands many of the same phases and activities as other systems development projects: planning, requirements definition, development, testing, and implementation are all critical. Certain activities within the life cycle, however, require special consideration for legacy transformation projects.

Requirements definition of legacy transformation projects first requires an "as is" assessment of the current legacy application portfolio and infrastructure. This assessment should identify at minimum:
- Current business rules and processes
- Core applications supporting the business
- Applications that overlap or are redundant
- Obsolete or unused applications

- Technical value and operational efficiency of applications
- Infrastructure components and constraints
- Potential improvements in efficiency and reduction of redundancy in both system and current business processes

All of these items must be understood thoroughly to specify requirements that truly meet the business need within technical constraints.

Development activities also involve unique strategies for legacy transformation projects. Project teams typically use one of two strategies for legacy system change: replacement or reuse. Both replacement and reuse can be divided into more specific actions:

Replacement
- Refactoring or software modification – Changing the code can produce new performance efficiencies and enable needed functionality. Refactoring involves examining a large component of code, perhaps one application in a portfolio, and writing replacement code, while removing obsolete or redundant code and eliminating unnecessary interfaces.
- Translation of the functionality to an equivalent system – Translating the system or application to an equivalent is not a complete change to the system but rather a change to a critical part. Translations demand strict governance to prevent unneeded changes to scope.
- Consolidation – Migrating data onto fewer databases and eliminating redundant data.

Reuse
- Wrapping – Wrapping involves "wrapping" legacy services in new code and making the services available as components.
- Extend/surround – The extend/surround approach is for applications that cannot be modernized for financial, technical, or risk reasons. Extending and surrounding the system with new software can provide the current software with added functionality.

For any standard project type – custom system, commercial-off-the-shelf (COTS), or hardware – one of these legacy transformation strategies may be used to achieve the transformation objective. For example, virtualization is a hardware wrapping strategy; consolidating physical servers in a virtual environment onto a single, more powerful server wraps a new environment around the existing servers. Implementing an enterprise resource planning system to replace several isolated applications performing the same function is a replacement strategy for a COTS legacy transformation project. Further, a custom software application that will have its code refactored and integrated with a COTS application, which will in turn wrap around the existing system and provide additional functionality, uses multiple transformation strategies.

3.0 RISKS AND RISK MITIGATION STRATEGIES

Legacy transformation projects have many of the same risks as other types of systems development projects. The impact of those risks, however, is frequently more severe than the impact of risks to traditional projects because legacy transformation projects involve changes to functioning systems that may be integral to current business operations. The following section includes common risks associated with legacy transformation projects and corresponding mitigation strategies.

Risk	Risk Mitigation Strategies
Underestimation of effort, schedule, and/or costs	Undertake discrete, manageable pieces of the project with big impact in shorter periods
	Conduct thorough planning and requirements analysis to understand true effort, schedule, and costs
	Involve knowledgeable technical resources in planning
Insufficient technical skills	Engage internal technical resources early and throughout the project to ensure sufficient technical knowledge transfer
	Evaluate necessary technical skills, and address identified technical needs in the Staffing Management Plan and the Training Plan
Organizational resistance	Develop and communicate business case
	Create and execute Communication Management Plan based upon stakeholder needs analysis
	Engage stakeholders throughout the life cycle
Disruption or degradation of service	Develop detailed transition plan as part of the Implementation Plan
	Develop a Contingency Plan
System quality deficiencies	Conduct extensive upfront analysis of applications and examination of business and technical capabilities
	Develop and execute a thorough Quality Management Plan and Test and Evaluation Master Plan

3.1   **Risk: Underestimation of effort, schedule, and costs**

In many cases, the effort required to execute legacy transformation projects successfully is underestimated, resulting in delayed schedules and unforeseen, unplanned costs. Underestimation of effort has a number of probable causes: the organization's desire to minimize costs and leverage existing assets; inadequate knowledge of planning and technical complexities inherent to legacy transformation projects; and inadequate knowledge and documentation of business rules and technical algorithms of the legacy system.

As in any systems development project, thorough planning and requirements analysis is necessary to obtain a true depiction of all necessary activities and the effort required to complete them. An up-front, in-depth assessment of existing applications and infrastructure ensures that planning accounts for the complexities of the legacy system. Project managers must also engage technical personnel with transformation expertise in the estimation and planning work. To mitigate schedule risks, project teams should consider undertaking discrete manageable efforts with big impact in shorter periods.

3.2   **Risk: Insufficient technical skills**

Depending on the development strategies employed, legacy transformation projects may encounter complex technical challenges. Project teams should ensure they possess technical resources with the appropriate knowledge and experience to successfully develop, test, implement, and maintain the transformed system. The project team should develop a Staffing Plan and a Training Plan that address the approach for obtaining all necessary skills. In addition, project managers should engage internal technical resources early and throughout the project to ensure sufficient technical knowledge transfer for operations and maintenance.

3.3   **Risk: Organizational resistance**

Stakeholder resistance to change can negatively impact project performance throughout the life cycle. In many cases, current technical staff and senior management prefer to rewrite or replace systems rather than utilizing existing infrastructure. To obtain stakeholder support, agency management must develop a sound business case that clearly demonstrates the advantages of transformation. This business case must then be communicated to stakeholders via plans in the Communication Management Plan, and stakeholders must be engaged and informed throughout the life cycle.

3.4   **Risk: Disruption or degradation of service**

Legacy transformation poses the risk of endangering current operations through failure or poor execution of the transformation. The best remediation of this threat is development and execution of a clearly scoped Implementation Plan that addresses all critical transition activities to maintain service level commitments. The Project Manager should also develop a Contingency Plan to identify specific contingency strategies and actions in the event that implementation negatively impacts the organization's normal business operations and services.

3.5   **Risk: System quality deficiencies**

Legacy transformation projects are sometimes erroneously perceived as simply part of operations and maintenance rather than complete, full life cycle projects. As a result, project teams may skip critical project activities that ultimately impact the quality of the delivered system. Legacy transformation projects require the same level of commitment as other large systems development projects and as such must adhere to all SDLC phase requirements. In addition, requirements specification and planning must be based upon an extensive upfront analysis of applications and examination of business and technical capabilities. The development and execution of a thorough Quality Management Plan and Test Master Plan will also help to prevent quality deficiencies from impacting operations.