3. PROJECT EASI/ED TRANSITION APPROACH

Project EASI/ED encompasses two major facets of change:

- Changes to ED business processes and systems used to deliver and manage Title IV student financial aid.

- Changes to the SFAP organization as structure, roles, responsibilities, and service delivery and contract models are redefined to enable SFAP staff to deliver services in accordance with the EASI vision and with EASI/ED objectives.

The broad scope of EASI/ED is the central to its complexity. The EASI/ED transition will touch both systems and organizations, internal and external to ED, through multiple parallel activities. These parallel paths within the transition must enable work to progress relatively independently, while remaining coordinated and being managed to ensure they meet at a common target.

The *Transition Strategy* takes into consideration EASI/ED's scope and complexities. This section presents the underlying principles and strategies on which the transition schedule (presented in Section 4) was built. Subsection 3.1 identifies the principal risks that EASI/ED implementation presents, and explains the strategies that were adopted to broadly address those risks. Subsection 3.2 explains the implementation concept – the implementation approaches used and the implied architecture – on which the transition schedule was based. Subsection 3.3 states the sequence in which the EASI/ED subsystems will be implemented and briefly explains the basis for this sequence. Subsection 3.4 discusses other considerations that were factored into the transition schedule's development.

3.1 Transition Approach

This subsection presents the approach and principles underlying the EASI/ED transition schedule. Subsection 3.1.1 briefly highlights many of the risks that EASI/ED implementation poses to ED. Subsection 3.1.2 discusses the strategies undertaken to address these risks – strategies that were then reflected in the transition schedule.

3.1.1 EASI/ED Risks

A single risk often threatens multiple aspects of a project. However, to facilitate a high-level understanding of the risks EASI/ED faces, key examples are presented below in four categories: technical, schedule, cost, and management.

Technical risks threaten the quality and/or completeness of the EASI/ED system. They include:

- Changing EASI/ED requirements during the transition period, which may lead to misdirection of effort or failure to satisfy users if not managed correctly.

- Potential difficulty in integrating or unifying the subsystems, which are based on loosely coordinated technology requirements (via the *EASI/ED COE*) to allow providers maximum flexibility in designing solutions.

- Technical difficulty of successfully implementing a bridging strategy to support incremental implementation of new EASI/ED subsystems while continuing operation of still-to-be-replaced current systems.

- Continuing, comparatively unconstrained changes to current system technology and functionality, which may lead to disconnects between planned and needed functionality and which may lead ED further away from a consistent technical architecture for the Title IV systems overall.

Schedule risks threaten timely completion of part or all of the EASI/ED transition. This category includes:

- Potential for acquisitions to take longer than projected, leading to schedule delays or to difficulty in keeping activities synchronized when multiple contractors are required.

- Imperfectly defined performance expectations, contract structures, skill requirements, and scope of work in acquisitions may lead to longer-than-anticipated performance periods for the resulting work.

- Lack of sufficient numbers of highly knowledgeable staff, both functional and technical, to perform many concurrent activities could delay progress.

- High coordination requirements across contracts to implement individual subsystems may lead to schedule delays as teams proceed under separate leadership and as meetings or other discussions are required to coordinate efforts.

Cost risks threaten ED's ability to complete EASI/ED within estimated costs.

- Unforeseen technical problems – e.g., with implementing bridges, integrating subsystems, completing an individual subsystem – could increase the cost of EASI/ED implementation.

- Cost estimates are tied integrally to the implementation options considered for each subsystem, and were outside the scope of the Transition Strategyning effort. Cost/benefit analyses or government independent cost estimates may result in estimates that exceed the available budget for the transition period.

- Costs to obtain highly skilled information technology staff are very high in the current labor market and EASI/ED requires substantial technical skill for successful implementation. High labor costs could affect overall EASI/ED cost or could drive ED to cost-based awards that *may* jeopardize service quality or delivery ability in some "hot" or very technically complex areas.

Management risks threaten ED's ability to manage and maintain the integrity of the transition and ultimately threaten ED's ability to successfully implement EASI/ED at all.

- Complexity of planning and managing multiple parallel, interdependent efforts requires highly skilled program managers and considerable program management and software engineering discipline. Without these skills and disciplines, successful EASI/ED implementation is jeopardized.

- Responsibility and authority to make work happen must be delegated to appropriate staff; if responsibility is muddy or if it is delegated without the authority to cause action, work will not proceed as planned or will stop.

- If sufficient numbers of ED staff with functional, technical, and management skills required to plan, manage, and evaluate project output are not available, EASI/ED is likely to flounder, to go off course in one or more projects, or to fail to meet full expectations for EASI/ED (due to lack of insight into student aid business).

- Strong, visible sponsorship of EASI/ED from senior ED managers – Secretary of Education, Deputy Secretary of Education, Assistant Secretary for OPE, Deputy Assistant Secretary for SFAP or Chief Operating Officer – is required to unify the organization in reaching for this goal. Without this, managers responsible for program and project management will have difficulty implementing the necessary disciplines and obtaining resources required to succeed.

3.1.2 Transition Strategies and Principles

The *EASI/ED Transition Strategy* addresses the risks identified above, and other similar issues, through the strategies that underlay the transition schedule and organization (Sections 4 and 5, respectively). This subsection introduces the seven key tenets of the transition strategy that broadly address these risks and are intended to help ED succeed in reaching EASI/ED objectives.

Tenet 1: Data is the key to integration. Transition to EASI/ED requires functionality to be implemented by multiple, independent contractors, while operating in parallel with a gradually declining number of the current Title IV systems. The EASI/ED enterprise database, which represents all the data required to support EASI/ED business requirements, is the key to facilitating this transition while maintaining the system's integrity and unity. The EASI/ED enterprise database will be based upon voluntary data standards coordinated by ED with the external postsecondary education community.

- Each **newly developed** EASI/ED subsystem will be required to use these standard attributes in its implementation, ensuring that the subsystem's interaction with other EASI/ED subsystems is consistent. If a subsystem is **outsourced**, the provider will be required to interact with users and with EASI/ED using standard data even if the underlying system(s) used to deliver service use different data or data outside the scope of EASI/ED requirements.

- When a Title IV system is reused, it becomes an integral part of the EASI/ED system, losing its former identity (e.g., CPS would become part of the Aid Application subsystem). Each EASI/ED subsystem implemented through **reuse** of an existing Title IV system (in whole or in part) also will use standard data. When a system is reused, the legacy database will be modified to use EASI/ED standard attributes wherever applicable and legacy applications will be modified to work with the updated database. This ensures that data can flow freely and accurately between old and new parts of EASI/ED.

- While the transition to EASI/ED is occurring, the current Title IV systems will continue operating, in whole or in part. To facilitate the **gradual replacement of current systems** with EASI/ED, data bridges will be built to allow the transfer of information between the current systems still in operation and the portions of EASI/ED that have been implemented. These bridges will ensure that both the current systems and EASI/ED have the data required to provide uninterrupted service delivery during the transition period.

Tenet 2: Implement in phases. Although EASI/ED will be implemented as a single system, it is important to remember that it is actually replacing 12 or more existing systems. Implementation of EASI/ED all at once would:

- Significantly increase the time before any value was provided to ED or external users;

- Increase the performance risk associated with a single contract; and

- Minimize the opportunity for EASI/ED to evolve and take advantage of previously accomplished work, changing technology, and lessons learned about the most effective development and implementation approach.

Beyond this, ED would require nearly superhuman predictive ability to ensure successful contracting for such an effort.

Instead, EASI/ED is planned for a phased implementation. Initially, system-wide design work and implementation of key infrastructure will occur. Subsequently, EASI/ED subsystems will be implemented in four distinct phases of activity. Within phases, ED will use multiple contract awards to ensure the best balance of continuity and specialized skills to complete the required work. This approach has the following advantages:

- If one project fails or is substantially delayed due to technical or performance issues, other projects within a phase can still proceed, as can other phases.

- At the end of each phase, or at other key points, ED can reassess changing technology and user requirements and incorporate the resulting insight or requirements into new acquisitions for subsequent work.

- By using multiple, independent acquisitions, ED can change contractors at the end of each project if a provider does not meet performance expectations for an earlier piece of work.

- Substantial results are associated with each project, so if the budget is insufficient to support continued work or if other conditions change, ED will still have a concrete product at the end of each phase.

Tenet 3: Structure work into discrete packages that lead to tangible results. Each "project" in the EASI/ED transition schedule represents discrete elements of work that lead to tangible results. As mentioned in Tenet 2, this means that ED will have a meaningful product as a result of any project. Beyond that, these work packages facilitate clear delegation of responsibility and authority. By ensuring that staff responsible for planning, managing, and implementing a work package can establish clear ownership of their areas of responsibility, overall program and integration management is simplified somewhat.

Tenet 4: Minimize technical risk. The need to minimize technical risk, and thus to increase the probability of successful EASI/ED implementation, is fundamental to EASI/ED transition planning. This tenet is manifested in the selection of a subsystem implementation sequence that minimizes construction of technically complex bridges. Bridges enable the exchange of data between current Title IV systems and the Project EASI/ED subsystems in order to maintain the SFAP operations throughout the transition. The technical complexity of bridges is due to the need to support time-sensitive, high-volume exchanges of data with built-in intelligence.

Technical risk is also manifested in the implementation concept, as decisions were made regarding reuse and project definition. When a subsystem provides highly interrelated functionality, its implementation is planned as an integrated effort even when diverse resources are required to perform the work (e.g., the Origination and Disbursement subsystem). When a subsystem comprises relatively independent "chunks" of functionality and when diverse resources are required to perform the work, each "chunk" is treated as a discrete subsystem. This facilitates clearer division of responsibility and performance requirements for each contractor. The integrator is then responsible for ensuring that the "chunks" provide the full subsystem functionality required and for integrating them with the remainder of EASI/ED.

A third manifestation of this tenet is the addition of focused system-wide design activities to the schedule to ensure that critical technical strategies and standards are established early for all of EASI/ED. Finally, the implied architecture presented in subsection 3.2.2 was defined with a view to minimizing the technical risk involved in ED's preferred implementation approach.

Tenet 5: Use prototypes and pilots strategically to explore technical and requirements issues. Prototypes and pilots can be used for great value in the EASI/ED transition. When used correctly, they provide an excellent, low-risk and low-cost tool for testing difficult technical solutions or for validating requirements that are fuzzy or have particularly high user impact. Section 4 presents a sample of prototype projects to use for the EASI/ED transition. As decisions are made about specific technology and or approaches, additional candidates will be identified and should be assessed for their value to the transition effort.

Tenet 6: Use interim improvements to provide near-term value to users. Interim improvements encompass changes to the current Title IV systems or the addition of limited functionality to provide early value to users consistent with the EASI/ED vision. Interim improvements are a great tool for building user support for the new system. In addition, by delivering some needed functionality early, and by building it upon existing capabilities, they help

alleviate schedule pressure on the more complex, long-term transformation of the current Title IV systems to EASI/ED.

Tenet 7: Use program management and integration roles to provide unity, discipline, and leadership. EASI/ED success requires very strong, dedicated program management by mature technical and functional experts. In addition, to hold the disparate projects and subprojects together and to ensure that system-wide integrity of design is maintained, a strong system integrator is required for this effort. The program management requirement is reflected primarily in Section 5 through the discussion of a dedicated program management office to oversee modernization within SFAP. The importance of the integrator's role is apparent in Section 4 through the range of activities for which this entity is responsible. Integrator roles and responsibilities are defined to provide maximum unity to the EASI/ED transition without stepping into the development roles. As described in Section 5, the integrator is also a key supporting contractor for the program management office staff across the multiple functions that the organization must address.

3.2 Implementation Concept

The *Project EASI/ED Transition Strategy* reflects two facets of an implementation concept. Subsection 3.2.1 explains how implementation options available to each subsystem are reflected in the schedule. Subsection 3.2.2 describes the implied system architecture that was used to validate the implementation options and to define activities and acquisitions.

3.2.1 Implementation Options

Four options for implementing EASI/ED functionality were considered during the definition phase: outsourcing, reuse, COTS software, and custom software development. A fifth option, reengineering, was added during the development of the *Project EASI/ED Transition Strategy*. Each EASI/ED subsystem may be delivered via one or more of these implementation options. Table 3-1 shows the results of initial analysis regarding which implementation options might be suitable to each EASI/ED subsystem.

Project EASI/ED Subsystems	Reuse Project	COTS Project	Reengineering Project	Custom Project	Outsource Project
Financial Services		X			
Aid Application	X	X		X	X
Program Management and Oversight	X	X	X	X	X
Aid Origination and Disbursement	X			X	X
Aid Repayment	X	X		X	X
Decision Support System		X			

Table 3-1 Project EASI/ED Subsystem Implementation Options

The EASI/ED transition schedule reflects one set of possible implementation options to deliver required functionality. Although the options presented do not represent final decisions regarding how EASI/ED must be implemented, the schedule provides important and durable insight into principal activities required to implement the system and into the relative timing and sequencing of

these activities. Project descriptions in subsection 4.2 include a high-level assessment of the schedule impact other applicable implementation approaches would have on a subsystem's schedule. Final decisions regarding which approach to use for each subsystem must be based upon cost/benefit analyses performed as the transition progresses.

In the interim, the transition schedule reflects ED preferences to follow a COTS-like approach by maximizing the use of COTS software to complement selective reuse of existing applications. Current applications selected for reuse are "packaged" to provide complete, integrated functionality, much as a COTS product does.

3.2.2 Implied EASI/ED Architecture

In order to evaluate the viability of the desired implementation approach and to understand the activities and acquisitions required to support the approach, a preliminary application architecture for EASI/ED was defined. To understand the EASI/ED transition schedule, readers must first understand this very high-level architecture. Figure 3-1 presents a drawing of the architecture. The remainder of this subsection describes the major components that comprise that figure and their relationships within EASI/ED.

The implied architecture has three principal components: the EASI/ED enterprise database, the EASI/ED user interface, and the EASI/ED subsystems. Although EASI/ED is defined in terms of six major subsystems, PMOS is effectively broken into separate elements for the transition schedule. The arrows on the diagram represent the flow of data among EASI/ED components.

EASI/ED Enterprise Database. As explained in subsection 3.1.2, data is viewed as the key to integrating EASI/ED subsystems, regardless of the implementation approach selected for each. The EASI/ED enterprise database is the first major component planned for development. It will be populated with data converted from existing Title IV systems, and the data conversion sequence and content will reflect the subsystem implementation sequence. i.e., data required to support the Financial Services subsystem will be converted first, followed by data needed for the Aid Application subsystem, and so on. Data conversion can proceed independently in advance of subsystem implementation, but must be completed for each subsystem before that subsystem can be implemented.

EASI/ED User Interface. EASI/ED is intended to provide a single point of contact for users within the postsecondary financial aid community (as defined for Project EASI). The system will use standardized data and a common look and feel in the user interface to improve ease of use (and to help reduce errors). To achieve this, on-line interaction with the system needs to be done through an integrated user interface instead of allowing each subsystem to have a separate user interface. By using a common user interface, the implementation approach for EASI/ED subsystems is entirely masked from users. For example, if origination and disbursement is initially implemented through reuse and later outsourced, this change would be transparent to the user. Their interface to the system would be untouched.

The EASI/ED user interface is envisioned as a combination of Web-based and browser-enabled applications that interact directly with the EASI/ED enterprise database (possibly via business logic not depicted on this diagram) and Interactive Voice Response Unit(s) (IVRU). As each

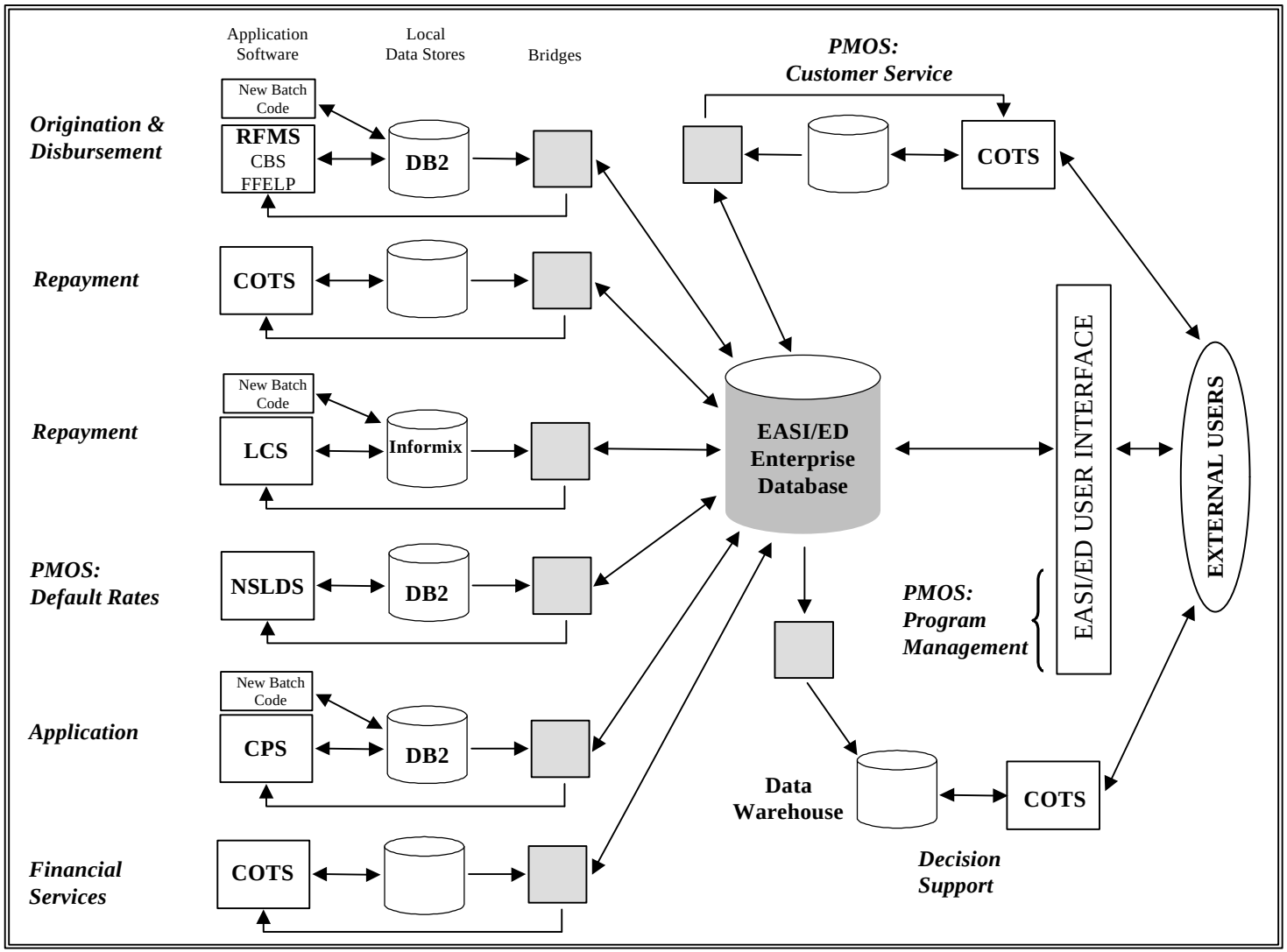

Figure 3-1 Implied EASI/ED Architecture

EASI/ED subsystem is implemented, the contractor(s) responsible for the subsystem will need to work closely with the user interface developers to ensure that subsystem business logic is accurately and appropriately reflected in the user interface.

EASI/ED Subsystems. The diagram indicates which subsystems are implemented primarily through reuse of current systems and which are implemented primarily through COTS software. The subsystem implementation approach depicted in the diagram effectively encapsulates the batch processing associated with each subsystem – protecting all but the customer service subsystem from direct user access. Customer service is the exception because users are expected to interact directly with the subsystem through customer service representatives, Internet access, and IVRU(s) associated with customer service.

Each subsystem comprises three principal components:

- **Application software** (shown as the white boxes) – primarily COTS packages or reused Title IV application code. COTS software is tailored to meet EASI/ED requirements or, in some cases, supplemented with custom code to provide full functionality. Reused applications are modified to standardize data to EASI/ED standards, modified to incorporate additional functionality integral to the existing application, and/or supplemented with custom code to provide full functionality.

- **Local data stores** (shown as the white canisters) – each subsystem will use a local database to support production processing. This database will be populated as a result of application processing. Once the database is updated as a result of processing, at intervals yet to be determined, the local database will transmit updates to the enterprise database via a permanent bridge. This approach alleviates capacity and contention problems that would arise from having subsystems perform production processing on the enterprise database, helps protect the integrity of the enterprise database, and promotes the COTS-like feel of this implementation approach (thus maximizing flexibility to change implementation approaches). Table E 3-1 in Appendix E provides more detailed information on how the functionality within each subsystem would be implemented.

- **Bridges** (shown as the gray boxes) – each subsystem will interface with the enterprise database via a permanent bridge that basically functions as a translator between the enterprise database structure and the subsystem. As data is received from the enterprise database through the bridge, it will be fed into the application (not the database) for processing. After processing is complete and the local database is updated, changes will be submitted to the enterprise database via the bridge.

The DSS is an exception from the standard implementation of local data stores and bridges described above. A data warehouse functions as the local data store for the DSS. This data warehouse will receive data from the enterprise database via the bridge. Data will not be fed directly from the bridge into the DSS applications.

Clearly the true application architecture for EASI/ED cannot be determined at this point in the project. System-wide design activities and subsystem-specific design activities must be performed before firm, informed decisions are made. Nonetheless, the implied architecture is necessary to form a basis for planning necessary at this point in the life cycle and is reflected in the transition schedule.

3.3 Subsystem Implementation Sequence

The subsystem implementation sequence shown in the EASI/ED transition schedule was selected by first determining which sequence would minimize the number of bridges that might be required to facilitate the transition. This sequence was then modified slightly by moving the Financial Service subsystem from third to first place in the implementation order. ED managers requested this change so that accounting and financial management functionality required to support all of the Title IV aid programs would be in place before other subsystems that use this functionality are implemented. The resulting sequence is:

1. Financial Services subsystem
2. Aid Application subsystem
3. Program Management and Oversight subsystem
4. Aid Origination and Disbursement subsystem
5. Aid Repayment subsystem
6. Decision Support subsystem

Financial Services and Aid Application subsystems comprise Phase I of the transition. PMOS is implemented in Phase II. Phase III comprises the Aid Origination and Disbursement subsystem and the Aid Repayment subsystem. Phase IV completes subsystem implementation with the DSS.

3.4 Other Considerations

Several other factors were considered in developing the *EASI/ED Transition Strategy*. The feasibility of partially shutting down existing Title IV systems was examined to determine whether the incremental implementation strategy could work and what the impact would be on existing systems and contracts. The results of this analysis are summarized in subsection 3.4.1. An assessment was also made of the relationship between the EASI/ED transition and the ongoing migration to Band 1. This is presented briefly in subsection 3.4.2. Subsection 3.4.3 addresses the issue of whether any of the current Title IV systems should be migrated to the EASI/ED COE while EASI/ED is being implemented.

3.4.1 Feasibility of Partial Title IV System Shutdown

High-level analysis of the physical structure of the current Title IV systems revealed that all Title IV systems have the potential to be partially shut down. The distinguishing factor is the degree of potential technical complexity associated with the partial shutdown of each system. Table 3-2 shows the relative feasibility of partially shutting down the Title IV systems.

Title IV Systems	Ease of Partial Shutdown Score	Relative Ease of Partial Shutdown Scale
CDS	53	Relatively Easier
CPS	49	
LCS	49	
LOS	49	
FFELP	47	
NSLDS	47	
PEPS	47	
CBS	45	
RFMS	43	
TIVWAN	41	Relatively More Difficult
LSS	33	

Table 3-2 Ranking for Ease of Technical Partial Shutdown

The methodology employed to determine the relative feasibility of partial shutdown for each of the Title IV systems is described in detail in Appendix C – Methodology, Section 1.1.2, Feasibility of Partial Shutdown of the Title IV Systems.

3.4.2 EASI/ED Transition Relationship with Band 1 Migration

The purpose of this analysis was to determine whether any current Title IV systems planned for migration to the Band 1 data center would be shut down prior to or near the time that migration is scheduled to occur. Based on the proposed EASI/ED transition schedule, Band 1 migration will be complete prior to implementation of the first EASI/ED subsystem. Therefore, there is no relationship between the Band 1 migration and EASI/ED transition.

The Band 1 data center is expected, however, to be the home for the EASI/ED technical infrastructure required to support development, implementation, and operation of EASI/ED. This will create a continuing relationship between Band 1 and EASI/ED.

3.4.3 Early Conversion of Title IV Systems to EASI/ED COE

One of the challenges that ED currently faces is managing and maintaining a Title IV system architecture that operates on many diverse platforms and technologies. The purpose of this analysis was to examine the EASI/ED transition schedule to determine whether any current Title IV systems should be considered for conversion to the EASI/ED COE during the transition period. For example, if a critical system in a difficult-to-support or highly incompatible technology was to continue operating for a considerable time (e.g., 5 years), ED might find it advantageous to reengineer the system to operate in the COE. Possible advantages would be greater interoperability

with other systems, more flexibility to accommodate changes, easier transition to EASI/ED (if the system is reused at all), and access to a larger pool of staff with necessary technical skills. The disadvantages of such a conversion are: (1) that reengineering is a technically difficult and time-consuming task, (2) that the conversion project might incur substantial cost and distract limited resources available to work on other EASI/ED transition activities, and (3) that the resulting system might not be retained long after the conversion is complete.

Several current systems already operate (or are planned to operate) in technical environments substantially in compliance with the COE. These include **RFMS**, **LCS**, **LOS**, and **PEPS**. **LSS** application software does not belong to ED and, therefore, was not considered for conversion.

Five additional systems are shut down during the transition schedule and are not candidates for conversion.

- **TIV WAN** chargeback functionality will be implemented as part of the Financial Services subsystem in Phase I, leaving only the telecommunications component.

- During Phase II, as PMOS is implemented, default rate logic and the associated database tables from **NSLDS** will be modified to EASI/ED standards and integrated into the EASI/ED system. NSLDS data will be converted to the EASI/ED database(s). No other NSLDS functionality is retained.

- In Phase III, the portion of **CBS** needed for EASI/ED will be modified and integrated with the Origination and Disbursement subsystem using RFMS as a base. No other CBS applications are reused in EASI/ED.

- **MDE** functionality will be integrated into the Aid Application subsystem during Phase I.

- Data from **CDS** will be converted to the EASI/ED database(s) and the system will be replaced when Aid Repayment is implemented.

The two remaining systems – CPS and the FFELP System – each play a continuing role during the transition.

- **CPS** is planned for reuse as the foundation of the Aid Application subsystem. In this role, the existing COBOL II/DB2 architecture will be retained, although any new custom code written for batch applications and not integral to existing CPS functionality will be COE compliant. Although the resulting Aid Application subsystem will not comply with the COE, good support exists for the technology used in CPS and there is no immediate driver to migrate its functionality to the COE. After initial implementation of all EASI/ED components is complete, ED may contemplate converting the Aid Application subsystem (reengineering, rewriting) to the COE so that in the long term a consistent technical architecture is achieved.

- The **FFELP System** is implemented in COBOL II and IDMS. The Debt Collection subsystem plays a significant operational role in student aid delivery and management and will be retained in operation until the Aid Repayment subsystem is implemented as part of Phase III. The Debt Collection Subsystem has experienced some capacity issues in the

past and measures have been instituted to address these problems. Although this subsystem is in need of replacement, undertaking an effort to convert the existing IDMS database and COBOL code to a COE-compliant technical environment is too technically demanding, time consuming, and costly for the time available before Aid Repayment is implemented. If Aid Repayment was delayed or cancelled, however, the Debt Collection subsystem is the one subsystem that should be considered for movement to a COE-compliant environment (effectively implementing a significant portion of Aid Repayment anyway).