

**Data Warehouse Management - Phase II  
Final Audit Report  
Report Nr. 26/10  
January 14, 2011**

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## Introduction

In accordance with our 2010 Audit Plan, EDC Internal Audit performed a Phase II audit of Data Warehouse Management. The Data Warehouse acts as the definitive source for EDC's customer, risk, financial and operational information. For example, it provides information for the reporting of risk exposures by country, industry and obligor and information on loan accruals, pricing and covenant status. The Data Warehouse is comprised of components including data marts, a foundation layer and a reporting layer. The foundation layer is a series of rules and functions applied to the data extracted from databases. The data derived from the foundation layer is transferred into the data marts. The reporting layer is accessed by users to extract data from the data marts for analytical and reporting purposes.

## Audit Objectives & Scope

The overall objective of this audit was to evaluate the operating effectiveness of controls surrounding data warehouse management through detailed testing. Our audit included an assessment of what Enterprise Risk Management (ERM) risks could materialize, identifying the controls in place to mitigate these risks and performing testing to evaluate their operating effectiveness. Specific areas of examination included controls to ensure:

- ▶ Changes to any component of the data warehouse are documented, tested and authorized prior to migration into production, including the maintenance of roll-back plans;
- ▶ Interface logs between the foundation layer and the data marts are monitored and any errors are addressed;
- ▶ Manual data uploads (templates) are approved, access to the R:Drive for manual uploads is monitored, and reconciliations are completed to test the accuracy of data.

The scope of the audit included the following data marts: CAS, Loans Provisioning, Credit Exposure, ACBS, Market Risk Management and Asset Liability Management data marts.

Audit fieldwork was performed during November and December 2010.

## Internal Audit Opinion

In our opinion, the Data Warehouse Management process is *Well Controlled*<sup>1</sup>. Key controls within the data warehouse management process are effectively designed and are operating as intended. A few moderate<sup>2</sup> issues were noted and are described in the following section.

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<sup>1</sup> Our standard audit opinions are as follows:

- **Strong Controls:** Key controls are effectively designed and operating as intended. Best in class internal controls exist. Objectives of the audited process are most likely to be achieved.
- **Well Controlled:** Key controls are effectively designed and operating as intended. Objectives of the audited process are likely to be achieved.
- **Opportunities Exist to Improve Controls:** One or more key controls do not exist, are not designed properly or are not operating as intended. Objectives of the process may not be achieved. The financial and/or reputation impact to the audited process is more than inconsequential. Timely action is required.
- **Not Controlled:** Multiple key controls do not exist, are not designed properly or are not operating as intended. Objectives of the process are unlikely to be achieved. The financial and/or reputation impact to the audited process is material. Action must follow immediately.

<sup>2</sup> The ratings of our audit findings are as follows:

- **Major:** a key control does not exist, is poorly designed or is not operating as intended and the financial and/or reputation risk is more than inconsequential. The process objective to which the control relates is unlikely to be achieved. Corrective action is needed to ensure controls are cost effective and/or process objectives are achieved.
- **Moderate:** a key control does not exist, is poorly designed or is not operating as intended and the financial and/or reputation risk to the process is more than inconsequential. However, a compensating control exists. Corrective action is needed to avoid sole reliance on compensating controls and/or ensure controls are cost effective.
- **Minor:** a weakness in the design and/or operation of a non-key process control. Ability to achieve process objectives is unlikely to be impacted. Corrective action is suggested to ensure controls are cost effective.

## Audit Findings & Recommendations

### 1. Promotion of Changes to Production

The ability to both design/develop data mart changes and then promote them into production does not provide adequate segregation of duties. A lack of segregation increases the risk of unapproved changes being promoted into the production environment. During the audit, we found that data mart changes are promoted into production by the same team responsible for designing and developing the change. Specifically, we noted that changes to the ACBS data mart are sometimes promoted to the production environment by the developer who also designed and developed the solution in the development environment. For the remaining data marts procedures have been put in place to segregate development from promotion. An audit trail demonstrating this segregation of duties does not exist however, we were able to obtain corroborating evidence.

The transfer of promotion activities from the development teams to the Operations Control (OC) is still in progress and IA recommends that this be completed for all data marts to ensure functional segregation of duties. Until the move to the OC group is complete, IA recommends the continuation of the current procedure of migrating changes by a System Analyst independent of the Analyst developing the change. This procedure should be extended to the ACBS data mart.

Rating of Audit Finding - Moderate

Action Owner - Program Delivery Manager, BSD - Solution Services

Due Date - Q3 2011

### 2. Scheduling and Review of Interface Logs

The monitoring of regularly scheduled interface logs is a key process in ensuring that, for example, data is transferred from the source applications (foundation layer) to the data marts. We found that the documentation describing the logs could be enhanced to allow for the OC group to fix certain types of errors when they are reported. In addition, we noted that a back-up resource for reviewing interface logs is not always assigned when the primary resource is unavailable. Corrective action to address this finding was implemented during our audit. Finally, in order to maintain evidence of corrective action related to the errors reported, IA is recommending that errors sent to the DW team from the OC group be recorded in a Remedy Ticket such that evidence of the error and the associated correction is maintained in a consistent format. This action was also implemented during our audit.

Rating of Audit Finding - Moderate

Action Owners - Manager, Operations Control in consultation with Program Delivery Manager- BSD  
Solution Services

Due Date - Q2 2011

### 3. Maintenance of Evidence Confirming Business User Involvement

The OC group, in conjunction with the BS&T Client Business Partners, has developed a business approval matrix which is consulted when there is a need to determine which business user is authorized to approve migration of changes to production. The current version of the matrix however, does not contain all the data marts. IA is recommending that, in conjunction with the move of the responsibility for deployment to production to the OC, that the DW team ensure the business approval matrix identifies the system owner and delegate(s) as appropriate, for each of the datamarts. Once updated, IA recommends that this matrix be consulted by the DW team to ensure proper authorizations are obtained prior to migrating a change to production.

The recording of business user involvement in the initiation, UAT testing and authorization to deploy changes to production mitigates against the risk that unauthorized and/or incorrect changes could be made to business applications and implemented into production. IA also recommends therefore that the appropriate business resource (as per the approval matrix) be given access to the Serena system used by the DW group to record their initiation, UAT testing and authorization of the changes to their data mart. If granting access is not feasible, then the email trail between the user and the developer should be maintained and inserted in Serena. In the case of changes to the ACBS DMS, the email trail between the user and developer should be inserted in PR Tracker.

Rating of Audit Finding - Moderate

Action Owner - Program Delivery Manager, BSD - Solution Services

Due Date - Q2 2011

#### **4. Periodic review and removal of user access to manual uploads**

In certain cases, new or revised data is uploaded manually to data marts. The ability to perform manual uploads circumvents the transaction controls embedded in the source application system which feeds the data mart. Accordingly, it is important to ensure all such changes are authorized and that the ability to perform manual uploads is restricted to an "as needed" basis. During the audit, we found authorization controls were operating as intended. In addition, an annual review was performed to remove users who no longer required this access. Although the review was performed, access was not removed. However, immediate action was taken by the DW group during the audit to remove access. Going forward we recommend that the request to remove users be completed in the change management tool (Remedy) in order to provide visibility into whether all steps have been performed.

Rating of Audit Finding - Moderate

Action Owner - Program Delivery Manager, BSD - Solution Services

Due Date - Q3 2011

### **Conclusion**

The audit findings and recommendations have been communicated to and agreed by management, who has developed action plans that are scheduled for implementation no later than Q3 2011.

We would like to thank management for their support throughout the audit.