

**Data Warehouse Management
Final Report
Report Nr. 02/10
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Introduction

In accordance with our 2009 Audit Plan, EDC Internal Audit performed an 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 corporate results, a view 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 design effectiveness of controls surrounding data warehouse management. Specific areas of examination included controls to ensure:

- ▶ Access to servers, data bases, foundation layer, and data marts are authorized and granted on an as needed basis;
- ▶ Interface logs between the foundation layer and the data marts are monitored;
- ▶ Changes to any component of the data warehouse are documented, tested and authorized prior to migration into production; and
- ▶ Key data fields within the data marts are periodically reconciled to the corresponding data fields in the source business application.

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. The audit addressed the following risk elements of EDC's Enterprise Risk Management (ERM) framework: system risk, infrastructure / information risk, financial management / reporting risk and fraud & ethical risk.

Audit fieldwork was performed during November and December 2009.

Internal Audit Opinion

In our opinion, ***Opportunities Exist to Improve Controls***¹ in the design effectiveness of Data Warehouse Management controls specifically pertaining to the uploading of data directly into the data marts. Uploading files directly to data marts creates data integrity risks by allowing users to make changes to data without being subject to normal transaction processing controls. Stronger controls are needed to periodically review who has been granted this access and to ensure it is still required. In addition, the process for granting users access to upload data files needs to be strengthened to ensure approvals are received from data mart owners prior to granting this access.

¹ 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.

Audit Findings & Recommendations

1. Access to Upload Data to Data Marts

Data files are currently uploaded or manually fed directly into certain data marts in order to supplement data in the reporting layer. Data added this way does not benefit from the integrity controls built into source business applications which may create inaccuracies within the data marts. To minimize this risk, it is important that the ability to upload data be granted strictly on an as needed basis and that this access be approved by the data mart owners. During the audit we noted that there is no periodic review of which users have been granted this access to ensure it is still required. As a result we found several users have access to upload data but no longer require this access. In addition, approvals are not always obtained from each data mart owner prior to granting access. We have recommended that users with the ability to upload data to each data mart be reviewed on a periodic basis to ensure access is still required. We have also recommended that approval be obtained from the relevant data mart owner prior to granting access to upload data.

Rating of Audit Finding - Major²

Action Owner - Program Delivery Manager, BSD - Solution Services in collaboration with Data Mart Owners
Due Date - Q2 2010

2. 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. We found that data mart changes are promoted to the production environment by the developer who also designed and developed the solution in the development environment. We recommend that changes be promoted into production by someone independent of development efforts.

Rating of Audit Finding - Moderate

Action Owner - Program Delivery Manager, BSD - Solution Services
Due Date - Q2 2010

3. Roll-Back Plans

A roll-back plan provides developers with the ability to restore the production environment to its prior state in situations where changes promoted into production fail or do not function as intended. In some cases, we found that the roll-back plan was limited to 'comments' describing the prior environment. If a promoted change fails in production, comments would be insufficient to recreate the prior production environment in a reasonable amount of time, preventing the user community from using the affected data mart. We have recommended that roll-back plans archive the previous instance of the production environment prior to promoting a change in the production environment.

Rating of Audit Finding - Moderate

Action Owner - Program Delivery Manager, BSD - Solution Services
Due Date - Implemented

² 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.

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 Q2 2010.

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