MIS 5121: Business Process, ERP Systems & Controls

Week 9: Security: User Management, Segregation of Duties (SOD)

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MIS 5121: Business Process, ERP Systems & Controls
Real World Control Failures:
By: Yizhou An
Control Failure: HP’s Acquisition of Autonomy

• **Background:**
  - Hewlett-Packard Company (HP): American multinational information technology company
  - Autonomy Corp: UK enterprise software company
  - HP acquired Autonomy in October 2011 for $11.1 billion in cash
  - Expectation: Autonomy’s data analytics and search technology would boost HP’s big data prowess

• **Control Failures:**
  - “Serious accounting improprieties, misrepresentation and disclosure failures” prior to the acquisition
  - Some former members of Autonomy’s management team inflated Autonomy’s financial metrics by:
    - Selling some hardware at a loss – booked those hardware sales as high-margin software sales
    - Selling software to value-added resellers – inflated revenue
    - Booking all future revenue for software subscription at once – inflated revenue again
  - In turn, Autonomy accused HP of a “textbook example of defensive stalling” to conceal evidence of its own prior knowledge and gross mismanagement and undermining of the company
Control Failure: HP’s Acquisition of Autonomy

• **Results:**
  - Mike Lynch, the former CEO of Autonomy was fired by HP in 2012
  - HP wrote down $8.8 billion of its $11.1 billion acquisition
  - HP lost $26 billion of its market value, 37% decline in its stock price in three months
  - HP had reached a $100 million settlement in a shareholder lawsuit

• **What Could / Should those in Authority Have Done Different?**:
  - Adequate due diligence and analysis before and during acquisition
  - Enhance external auditing to disclose Autonomy’s accounting fraud

• **Reference:**
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Real World Control Failures: Parmalat
By: Shuvam DasGupta
Control Failure: Parmalat, Italy

• **Background:**
  - Parmalat is multinational Italian dairy and food corporation
  - $8.5 billion to $12 billion in vanished assets – Europe’s biggest bankruptcy

• **Control Failures: 2002 - 2005**
  - Falsified accounts over a 15-year period
  - 38% of Parmalat’s assets was shown to be help in a $4.9 billion BAC account – which never existed
  - Managers created assets to offset almost $16.2 billion in liabilities
  - Used derivatives and other complex financial transactions to shore up the balance sheet
  - Accountants hide losses of almost $10 billion
  - CEO Calisto Tanzi misplaced almost $990 in company funds for his own use
  - Tanzi’s Family controls 51% of the company

• **Results:**
  - Calisto Tanzi, his son Stefano, brother Giovanni, former CFO Fausto Tonna, Former board members, company’s lawyers went under investigation
  - Tanzi was arrested on suspicion of fraud, false accounting, embezzlement and misleading the investors
  - Implementation of the a new financial market monitoring system modeled on Britain’s FSA by Italy government

• **What Could / Should those in Authority Have Done Different?:**
  - Proper implementation of Corporate governance
  - Supervision of the international or that country’s regulatory aspects
  - A proper monitoring mechanism for the company’s control structure

• **Reference:**
  - [https://en.wikipedia.org/wiki/Parmalat](https://en.wikipedia.org/wiki/Parmalat)
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Real World Control Failures
By Gladys Guardia
Control Failure: Governance

• **Background**
  - Sony Pictures Entertainment was hacked by group called Guardians of Peace on November 24, 2014 and the duration of the hack was unknown (some estimate a year prior to discovery of attack)
  - GOP obtained access to servers and installed malware
  - 10 TB of data taken including Personal Identifiable Information, Intellectual Property, emails, etc.
  - Play Station Network breach in 2011- Sony Pictures Entertainment did not learn from the mistakes of this breach

• **Control Failures**
  - Data retention policies were non-existent
  - Data was not categorized, secured, or encrypted
  - Executive Director talked auditors out of reporting failures relating to Access Controls
  - Lack of corporate wide protective measures and information security training for employees
  - No standardized processes such as inventory control, vulnerability assessments, employee training
Control Failure: Governance

- **Results**
  - In previous hacks, most criminals wanted credit card numbers or PII to sell— with Sony, hackers aimed for reputation damage which is tougher to quantify & continues causing harm months after.
  - Immediate financial damage: 10% drop of company’s stock in wake of breach.
  - $15 million to rebuild computer network & conduct forensic investigation attack.
  - Failure of properly securing employee PII brought joint lawsuits from employees for PII stolen – threat of harm due to data being posted online for anyone to grab.
  - Healthcare records stolen will bring more lawsuits due to the medical records protection laws California & other countries have in place.

- **What Could / Should those in Authority Have Done Different?**
  - Identify & segregate PII/IP.
  - Add layers of encryption to protect internal traffic from prying eyes.
  - Isolate confidential materials from central data-storage systems connected to the Internet.
  - Assure data loss prevention and intrusion detection systems are part of architecture.
  - Educate employees on information security practices company-wide.

- **Reference**
Remaining Exercises

- Exercise 3: Journal Entries  
  **Due:** March 21

- Exercise 4: Segregation of Duties  
  **Due:** March 31

- Final Case: Risk / Control Matrix  
  **Due:** April 28

- Class Visitors: auditors  
  **Date TBD**
  - Ernst & Young – auditing manager and SAP subject matter expert
  - Discussion / Q&A format (~30 minutes)
  - Gather discussion topics and your ?’s next week

(2016)
Security (Continued): User Management
SAP Security: Review

- Program
- User ID
- Authorization Object
- Authorization Values
- Authorization Checks
- Authorization Fields
- Roles / Profiles
SAP Security: Review

- Program
- Imbedded In
- Lock: Authorization Object
- Tumblers: Authorization Fields
- Core: Authorization Checks
- Keys: Roles / Profiles
- User ID
- Assigned To
User Administration – SU01

User Master Record
• Key: User ID *(Same as for other Systems?)*
• Contains privileges of the user
• Roles (and related profiles) assigned
• During SAP logon all assigned authorizations loaded from master record into User Buffer
• Other Data:
  – Address, Contact Info
  – Default Date format, decimal format
  – User Parameter data (can be used to prepopulate Data)
  – User Groups
Create user ID – SU01

Complete as many fields as possible (per user administration standards)

Certain fields may be required
Create user ID – SU01: User Type

- **Dialog (A):** Normal type user
  - Password enabled (check, change expired, ...)
  - Multiple logons checked and logged

- **System (B):** e.g. Batch User
  - Communication without dialog in one system or
  - Background processing in one system
  - Excluded from general password validity settings (change, expiration, etc.)

- **Communication (C):** Communication between systems (without dialog)
  - RFC or CPIC service users. E.g. ALE, Workflow, TMS, CUA
Create user ID – SU01: User Type

- **Reference (L):**
  - General user not assigned to person
  - Cannot log on using Reference User
  - Used to equip Internet users with identical authorizations

- **Service (S):**
  - Required for dialog-free communication between central components of SAP via PI
  - Used by Java components of PI
  - PI (Process Integration) is SAP Netweaver integration tool
  - Used between SAP modules (e.g. ECC, GTS, CRM, SRM, ...) and non-SAP applications
  - Generally this user is assigned very restricted authorizations
Create user ID – SU01: Logon Data

- **Alias**: Reference for internet applications / users. Max 40 characters

- **Password**: Initial password

- **User Group**: Department, country, … Can be used for security and in SUIM

- **Validity Period**: For temporary users (e.g. contractors)
Create user ID – SU01: Defaults Tab

- Complete fields per User Administration Standards

- **Formatting**: Changes what appears on screen, not what’s stored in system (display format only)
  - Language
  - Decimal Notation
  - Date Format
  - Time Format

- **Output Device**: Default printer / output parameters
  - LOCL – uses PC’s default printer (can be formatting issues)

- **Time Zone**: Display only?
  - Note system time zone
Create user ID – SU01: Parameters

- Parameters: Screen independent data
- Usually linked to a field (e.g. plant, sales org, ...)
- Useful to automatically provide a default value for a field
- Also used to manage via user settings how SAP works (e.g. ability to save OTC variants)
Parameters: Most fields Have one
Create user ID – SU01: Roles / Profiles

- Security Repository for User
- Note: Effective dates for Roles
- Profiles tab auto-populated based on Roles Assigned
- Details from these tabs pulled into User Buffer during Logon
Delete user ID – SU01

- Deleting ID’s impacts items associated with ID
  - Parked documents
  - Workflow requests
  - Batch Jobs

- Recommend inactivating rather than deleting in production (e.g. for defined transition period of time)
  - Inactivate by ‘Locking’ the user
SU10: Mass User Maintenance

- Same action – multiple IDs
- Limited data tabs (e.g. Address, Authorizations, ...)
- When would you use?
SU01 / SU10: Lock / Unlock

- User / Password Administration
- Recommend Users manage their own passwords / sign-on credentials when possible
- Change password – for dialog users requires resetting at next logon session
- SU01 – single User ID
- SU10 – Multiple ID’s
SUGR: User Groups

- Define user groups with SUGR
- Assign Users to groups in SU01, SU10, ???
- Can do following with User Groups
  - Segregate users by technical teams (e.g. Basis, development, training, etc.) or process teams
  - Pull ID’s into SU10 (Mass Maintenance) by user groups
  - Reporting: can help with auditing
User Authentication

And You are Who ??!? 

• Designed to protect system availability, integrity and privacy
• Authentication methods provided in SAP include:
  – Logon with password (Dialog user)
  – Secure Network Communications (SNC) (Single sign on?)
  – Client Certificates (interfaces?)
  – SAP Logon Tickets
  – Pluggable Authentication Services

Alignment of client policies and auditor judgment is important
Logon with Password Security

• Initial password must be assigned to user
• Passwords must meet internal requirements set by system (SAP Password Rules)
  – Cannot be more than 8 characters
  – First character not ‘, ? or space
  – First three (3) characters not same order as User ID
  – First three (3) characters not identical
  – Password cannot be ‘Pass’ or ‘SAP’
  – User can change password maximum of once per day
  – User defined password cannot be same as last five (5) passwords
Logon with Password Security

Password parameters that Can be set by Customer (Customer Password Rules)
• May not be in a list of impermissible passwords (table USR40)
• Must be at least 6 characters long
  – System profile parameter login/min_password_ing
• At least one (1) character in the new password must be different from old password (can’t shuffle same characters)
  – login/min_password_diff
• Must be changed periodically (e.g. every 60 days)
  – login/min_expiration_time
• Password Contents
  – login/min_password_uppercase     login/min_password_lowercase
  – login/min_password_letters      login/min_password_digits
  – login/min_password_specials
Access Other than User ID / Password

Secure Network Communication (SNC)
- Available when using SAP GUI for Windows or Remote Function Call
- Uses external security product to authenticate

Client Certificates
- Used for Web applications such as SAP Web AS ABAP
- Authenticate by user presenting X.509 client certificate
- Authenticate takes place on Web server using Secure Sockets Layer (SSL) protocol
- Transfer of passwords not needed
- ‘Single Sign-On’
Access Other than User ID / Password

SAP Logon Tickets

– Single Sign-on to multiple SAP Systems
– Authenticate once and SAP logon ticket is issues
– Log in to other systems (SAP / non-SAP) via ticket

Pluggable Authentication

– Delegates authentication to external system
  • E.g. Windows Domain Controller or a Directory Server
– External system obtains SAP User ID from mapping table USREXTID
– If successful: User issued a logon ticket (see above)
User Management Overview

• User Types (examples, why different)

• User Maintenance (Create / Change / Delete)
  – Examples of data maintained and why

• Password Options
  – Couple Examples of SAP password rules and why useful
  – Couple Examples of Customer Password Rules (configuration options and why useful)
Security (Continued):
Role Design
SAP Security Role Design

Defining Roles
Define roles within each business process and mapped to jobs, positions and users

Access requirements for each roles identified by:
- Transaction Code
- Organizational Hierarchy access
- Other functional system access

Role relationships and access requirements should be fully documented and continually refined throughout the project.
SAP Security Role Design

Restricting Access

– Transaction Codes (T-Codes) Develop roles
  • Ex: ME21N, ME22N, ME23N (Create, Change, Display PO)

– Organizational Scope Criteria (Business areas configured in SAP)
  • Plant
  • Company Code
  • Sales Organization

– Activity Level (e.g. Display PO’s only allow viewing)
  • Create
  • Change
  • Display / View
SAP Security Role Design

Role Concept Overview
SAP application security uses roles to group transactions necessary for users to perform their job

– Develop roles
– Example: Maintain Purchase Orders role allows users to create and change PO’s
– Positive security approach: develop roles so least amount of privilege or authorizations are assigned for any one user to perform their job
Role Definition: Job Level  

- Must assign common transactions to many roles
  - Increases risk of configuration error (role creation and maintenance)
  - More complex model (e.g. single T-code assigned to many users – why??)
- Roles become very large
  - Small changes may require considerable ‘clean-up’
  - Large roles with many responsibilities difficult to manage
  - Higher risk of Segregation of Duties (SOD) compromise
- Creating almost identical access for multiple users / positions
  - Decreased control of consistency over security configuration

*Job level security not standard methodology*
Role Definition: Task Level  Option A

- Common transactions in fewer roles
  - One role adjustment automatically activated for all assigned users

- Less effort to configure & Maintain
  - T-code changes require less ‘clean-up’ because roles smaller
  - T-code adjustments occur less often (most changes involve only re-mapping of roles to users)
    - Simpler model -> less effort to configure & maintain

- User maintenance (role assignment) more complex but more flexible
SAP Security Role Design

Managing the Tension

Role Complexity
Larger Roles
Maintenance ‘clean-up’
Risk of SOD in roles

User Role Mapping Complexity
Smaller, more Roles
Simpler role maintenance
Risk of SOD via multiple roles assigned

Job Based
Task Based
Security Design: Best Practices

- Design security considering cost vs. benefit
- Use Risk based approach to design security measures and build a controlled environment
- Global design: standardized
- Flexible model (anticipate future additions, changes)
- Use ‘Least privilege access’
- Create application specific roles consistent with organization roles
- Leverage pre-designed security roles if possible
Security Design: Best Practices

• Application security consistent with company policies, requirements, procedures (e.g. password expiration)

• Minimize custom code (use ‘out of box’ functions if available)

• Integrate security design / policies with all implementation threads / teams
SAP Security Role Design

Managing the Tension

Role Complexity
Larger Roles
Maintenance ‘clean-up’
Risk of SOD in roles
Unique Role Design – more roles
Role Flexibility

User Role Mapping Complexity
Smaller, more Roles
Simpler role maintenance
Risk of SOD via multiple roles assigned
Global, standard Roles
User mapping Flexibility

Job Based
Task Based
Security Role Design Overview

• Job vs. Task level Definition
  – What are the trade-offs
  – Who / How to define?

• Best Practices
  – Design from beginning
  – Standardization vs. flexibility
  – Least Privilege Access Concept
  – Addition Couple best practices
Security and Segregation of Duties (SOD)
Segregation of Duties

**Definition**

‘ensuring that at least two individuals are responsible for the separate parts of a task’

**Goal:** prevent error and fraud
Segregation of Duties

Implementation

- Break down tasks that might reasonably be completed by a single individual into multiple tasks
- No one person is solely in control
- Prevent one person from having 2 of:
  - access to / custody of assets (operational responsibility)
  - Responsibility for asset’s accounting / reconciling
  - Approval
- Prevent opportunity to commit and hide errors, fraud, theft
Segregation of Duties

Other names

- Separation of duties
- Four eyes / two-man / two-person principle: two individuals approve some action before it can be taken

Implications

- Break down can make process less efficient, require more people
- Choose where to implement (high risk, mission critical)
SOD Examples

Examples of SOD related risks and controls in each area discussed

- Procure to Pay Process
- Order to Cash Process
- Master Data
- Financial Processes
- Inventory

*Person who ______________ should not be the person who ______________.*
SOD Examples

Procure to Pay
• Person who requisitions the purchase of goods or services should not be the person who approves the purchase.
• The person who approves the purchase of goods or services should not be the person who reconciles the monthly financial reports.
• The person who approves the purchase of goods or services should not be able to obtain custody of checks.

Order to Cash
• The person who negotiates Customer Prices should not be the person who approves the prices
• The person who negotiates or approves Customer Prices should not be the person who enters the prices used on orders
• The person who opens the mail and prepares a listing of checks received should not be the person who maintains the accounts receivable records.
SOD Examples

Master Data
- Person who creates / maintains customer master data should not be the person who processes customer orders or receives payment.
- Person who creates / maintains vendor master data should not be the person who processes purchase orders or processes vendor payments.

Financial Processes
- The person who approves journal entry values should not be the person who enters or reconciles the journal entries.
- The person who maintains and reconciles the accounting records should not be able to obtain custody of checks.
- The person who opens the mail and prepares a listing of checks received should not be the person who makes the deposit.
SOD Examples

Inventory Controls

• Person who physically handles inventory should not be the person who enters inventory related transactions

• The person who counts inventory stock should not be the person who reconciles vs. system inventory records not enters inventory adjustments.
Segregation of Duties (SOD) Overview

- SOD Definitions
- SOD Implementation Concepts
- SOD Examples
  - 1 or 2 in each area
  - How phrased
Break Time
Segregation of Duties Exercise 4

• Primary learning objectives are:
  – Experience how to specify controls to address known business risks
  – Review and assign positions appropriate to handle process tasks
  – Make choices to manage the tension of SOD controls vs. excess personnel costs
  – Translating process tasks assignments to computer task assignments
  – Creating authorization design details necessary to implement security that enforce SOD
Steps

1. Determine appropriate controls to mitigate defined business process risks. You will also be asked to assess additional risks associated with this business process.

2. Using the risk analysis as a base, examine assigned positions within the organization to be sure that there is adequate segregation of duties without incurring excess personnel costs.

3. Develop an authorization matrix that specifies the extent of computer access for each of the employees designated in the previous step (transitioning from paper-based to integrated ERP System environment)

4. Examine the SAP authorizations where you will see how to establish rules that enforce segregated duties.
Segregation of Duties Exercise 4

• Agenda
  – This Class (*March 21*): Steps 1 – 2 (Risks / Control & Organizational design with SOD)
  – Next Class (*March 28*): Step 3 - 4 (Paper process to system process with SOD and authorizations to design)
  – *Due March 31 11:59 PM*: Assignment Submission
Segregation of Duties Exercise 4

Step 1: Determine appropriate controls to mitigate defined business process risks. You will also be asked to assess additional risks associated with this business process.

a) For first 5 listed risks – Identify from suggested list the top 3 Controls to use

b) Identify for GBI 3 additional risks for the process defined (an Order to Cash example). Then from suggested list choose top 3 Controls you recommend using
Segregation of Duties Exercise 4

Step 2: Using the risk analysis as a base

a) Examine matrix of assigned positions within the organization vs. each process task

b) Adjust (including adding positions) to be sure that there is adequate segregation of duties for the process without incurring excess personnel costs.
Extra Slides
Segregation of Duties Exercise 4

Step 3:

a) Examine the list of ERP System documents required to execute the process (from Step 2)

b) Develop an authorization matrix for each document and each organization position who uses document (e.g. specifies the extent of computer access for each of the employees)
Segregation of Duties Exercise 4

Step 4: Examine the SAP authorizations where you will see how to establish rules that enforce segregated duties.

a) Tools -> Administration -> User Maintenance -> Role Administration -> Roles (PFCG) View predefined roles and related authorizations (Page 18 of guide)

b) Answer questions related to your review / analysis