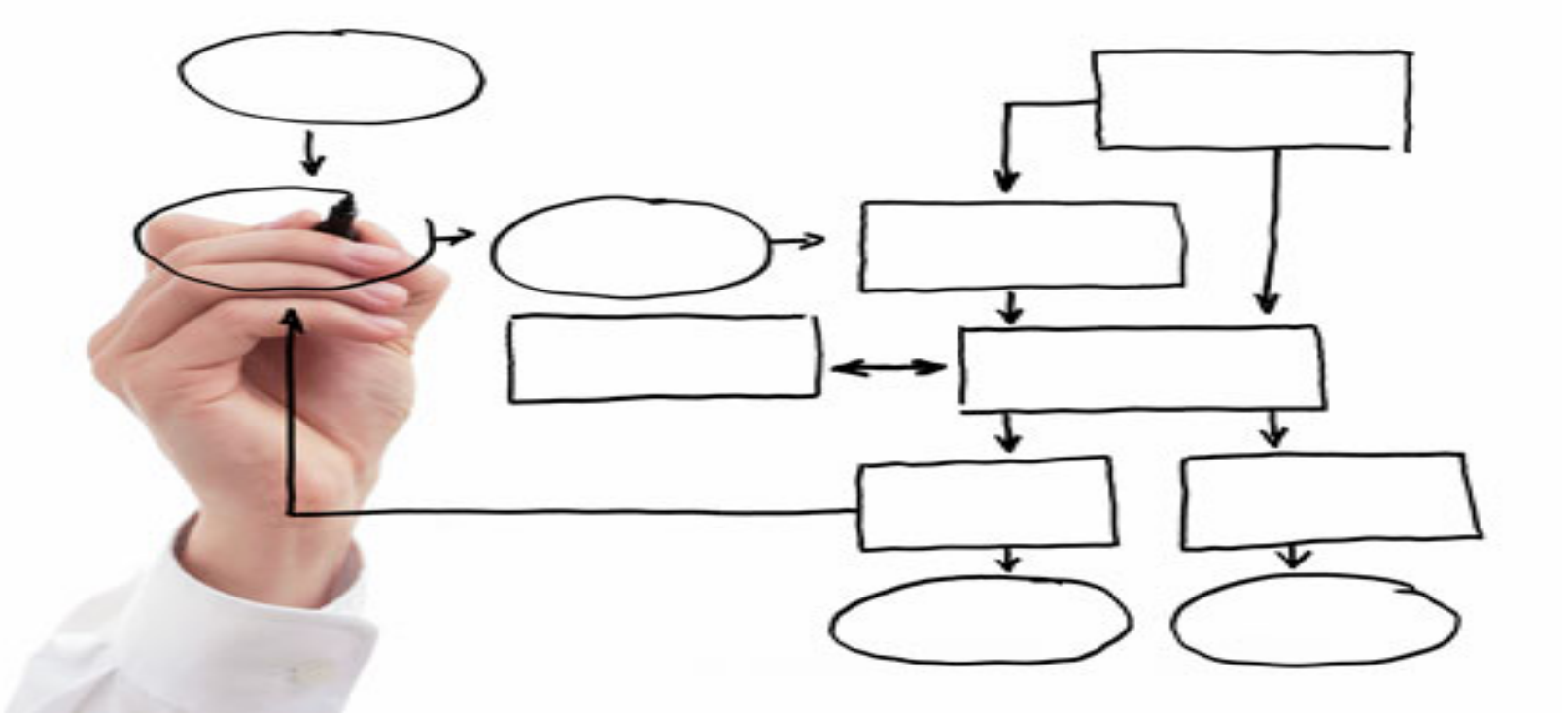

MIS 5121: Enterprise Resource Planning Systems

Week 11: *Change Management, IT Controls Framework*

FOX | MIS
Management Information Systems

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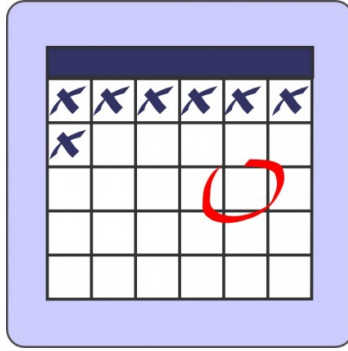
ff

MIS 5121: Upcoming Events



- Exercise 4 (Segregation of Duties) – *Past Due: April 2*
- Reading Assignment 7 – *Past Due: April 5*
- **Exam 2** – In class*: April 6 (today)*

- Reading Assignment 8 – *Due: April 12*

- Reading Assignment 9 – *Due: April 19 (Week Earlier)*

Control Failure: Deepan Patel's Presentation

- Background:
  - ❖
  - ❖
- Control Failures: 2006 – 2009
  - ❖
  - ❖
- Results:
  - ❖
  - ❖
- Reference:
  - ❖

Control Failure: Ivy Zhu's Presentation

- Background:
  -
  -
- Control Failures: 2006 – 2009
  -
  -
- Results:
  -
  -
- Reference:
  -

Control Failure: Jingyi Zhou's Presentation

- Background:
  - ❖
  - ❖
- Control Failures: 2006 – 2009
  - ❖
  - ❖
- Results:
  - ❖
  - ❖
- Reference:
  - ❖

Change Management
SAP: Transport Management

Typical SAP Landscape

Development System

Type of Users:
-
-
-

Type of Work:
-
-
-

Quality-Assurance System

Type of Users:
-
-
-

Type of Work:
-
-
-

Production System

Type of Users:
-
-
-

Type of Work:
-
-
-

Typical SAP Landscape

Development System

Type of users:
Developers,
Consultants,
Key Users

Type of work:
Customizing,
Development,
Unit Testing

Quality-Assurance System

Type of users:
Developers,
Consultants,
Key Users

Type of work:
Integration and
Quality testing

Production System

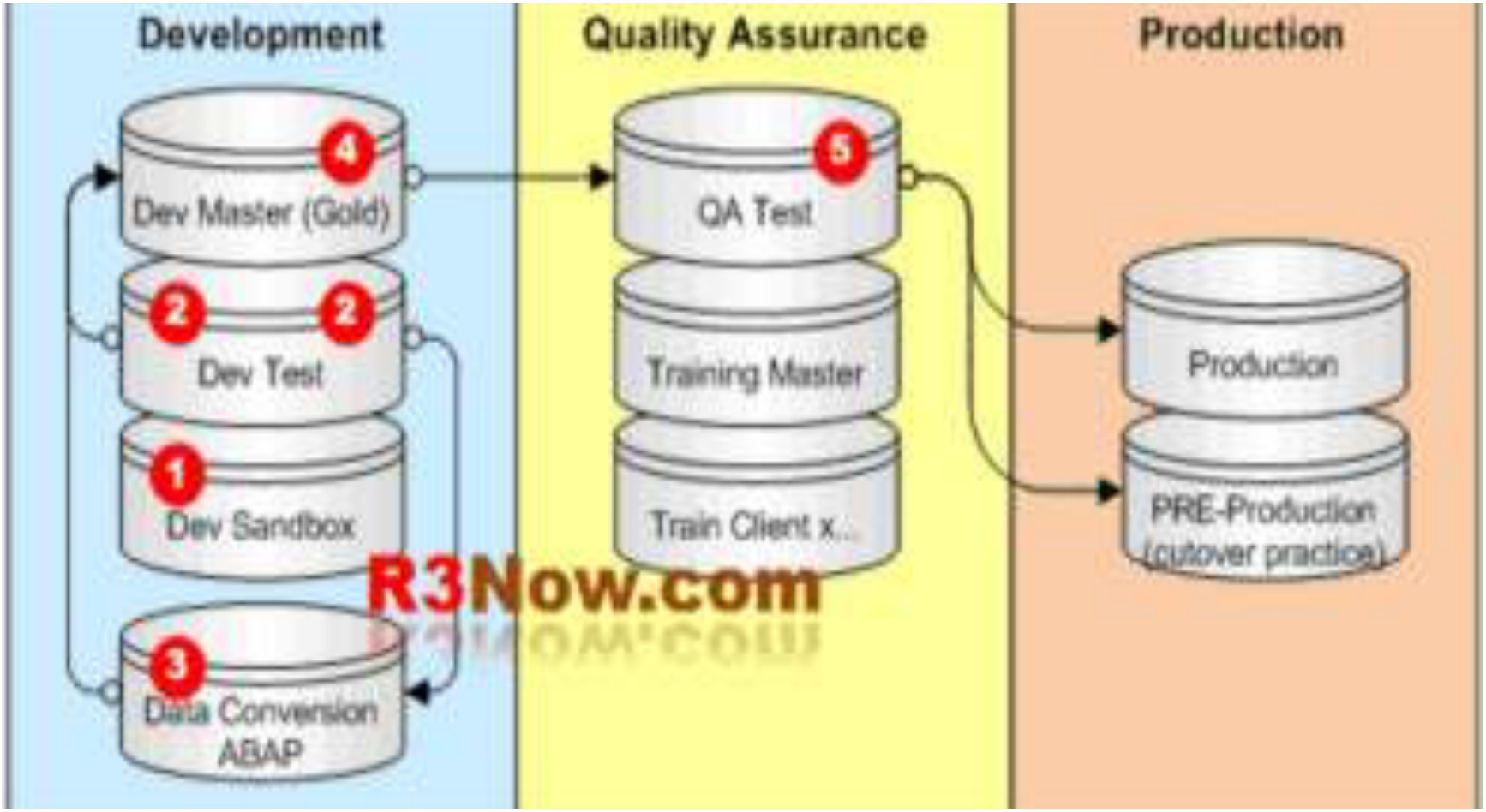
Type of users:
End users

Type of work:
Productive
execution of
transactions
with real
business data

SAP Landscape: Instance and Clients

- **SAP Instance**
  - Instance also referred to as a system
  - An Instance has a dedicated physical database
  - One installation of SAP software (source code / modules) and related logical database is an instance
  - Instance shares SAP and developed software ‘code’ base
  - Documentation of instances (systems) and clients often called: **‘Client / System Landscape’**

Minimum Rec'd SAP Landscape



SAP Landscape: Instance and Clients

- **SAP Clients**
  - Client is highest organization level with SAP System
  - At least one client per system (e.g. ‘100’)
  - Master data is stored and Business transactions occur within a client
  - Single logical database (linked to system / instance) may contain several clients
  - Production Client typically represents a logical grouping of multiple companies

Client Dependent vs. Independent

System/Instance

Client Dependent

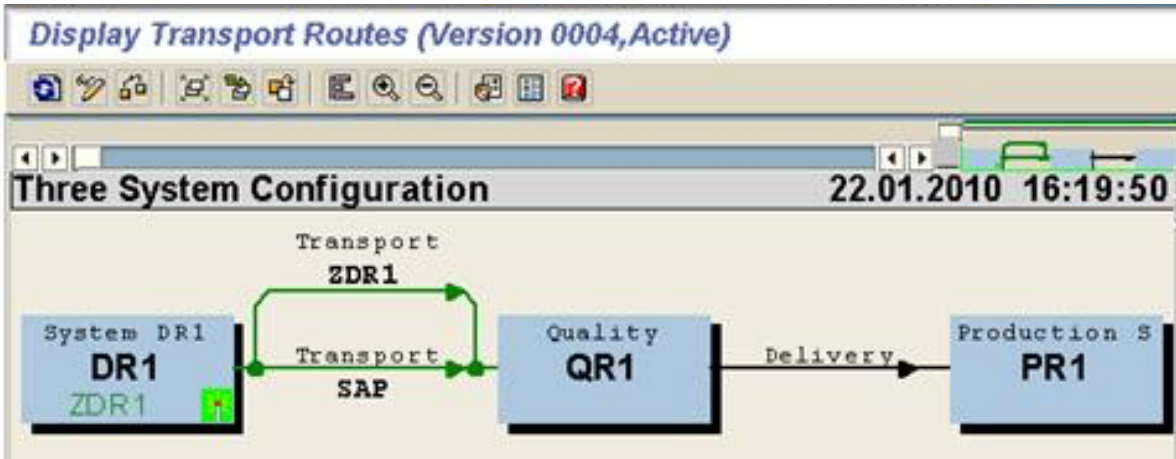
Dev 100 Master (Gold)	Dev 110 Dev Test	Dev 180 Data Conversion	Dev 900 Sandbox
- Master Data - Transaction Data - User Management / Data	- Master Data - Transaction Data - User Management / Data	- Master Data - Transaction Data - User Management / Data	- Master Data - Transaction Data - User Management / Data

Client Independent

- **Programs (ABAP)** **> Repository Objects (Client Independent Config**
- **Data Dictionary** **- Currency, UOM's**
- **Parameters** **- Pricing Tables**
- **Authorization Objects** **> Transactions**

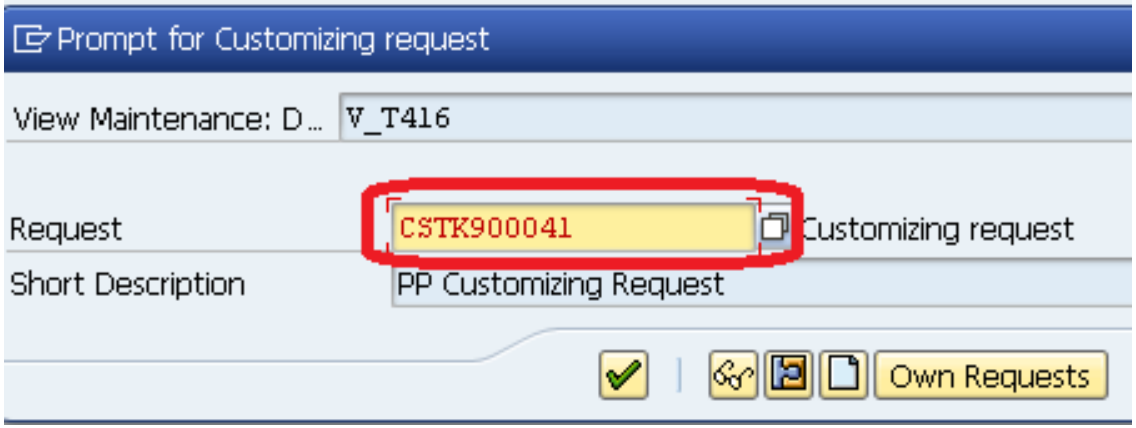
SAP Change Management

- SAP's Correction and Transport System (CTS) provides framework for proper change control process
- SAP's TMS (Transport Management System) is subset of CTS
- TMS Transport Routes / Paths (transaction STMS) move changes between Clients / Instances (e.g. to test, Production)
- Transaction STMS



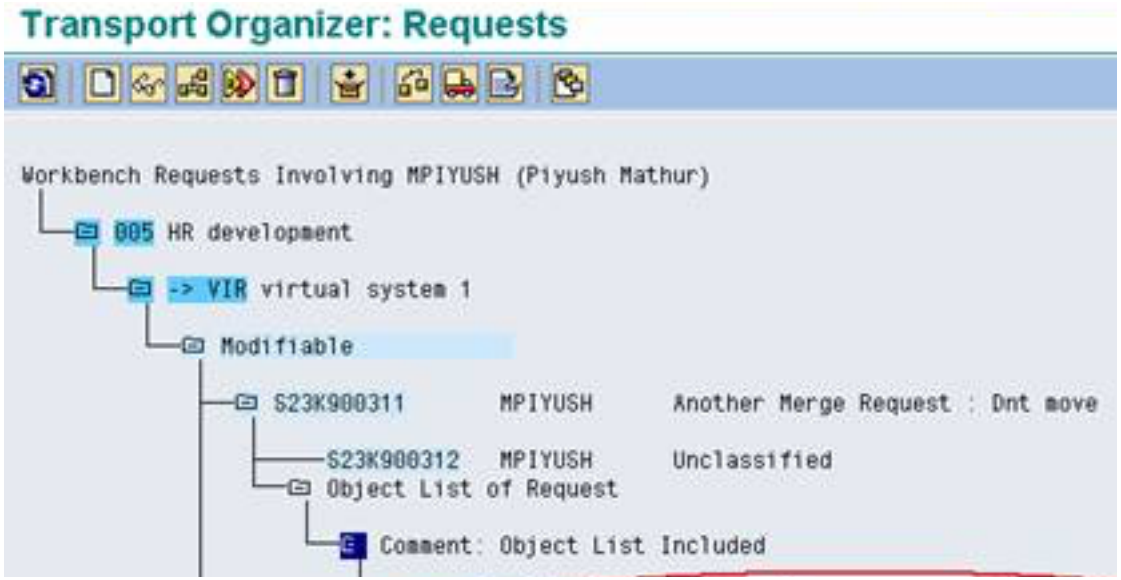
SAP Change Management

- System changes on save Prompt for Transport Request (New or include in prior ‘open’ request)
- Transport in addition to change meta data (creator, create date/time) includes details of the change
  - Configuration table entries (changes)
  - Development object (code change)
- Assigns unique transport Number

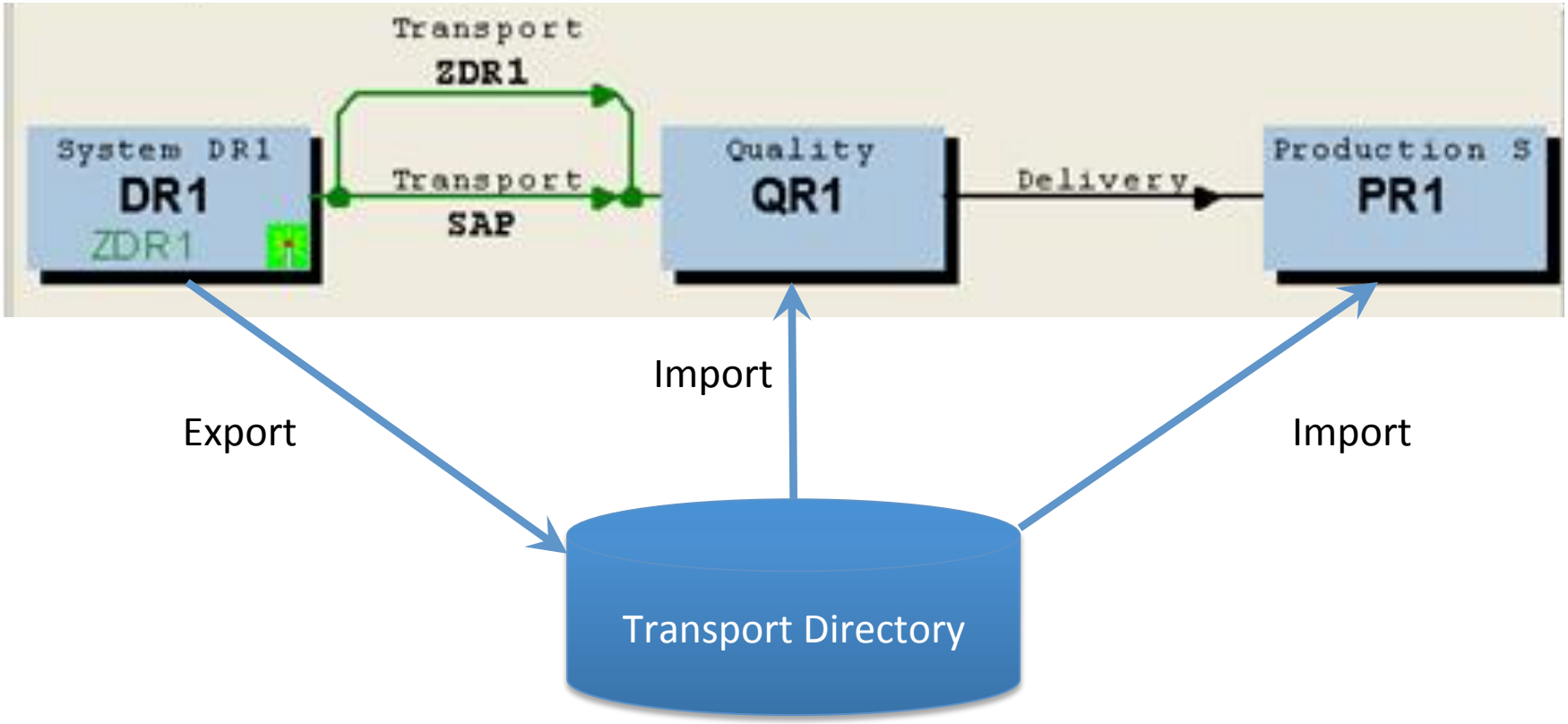


TMS Terminology

- Transport (the truck icon): contains the changes (including role changes) moved from client to client and system to system per transport path
- User ‘owns’ the change request and it’s details.
- User must ‘release’ transport prior to migration



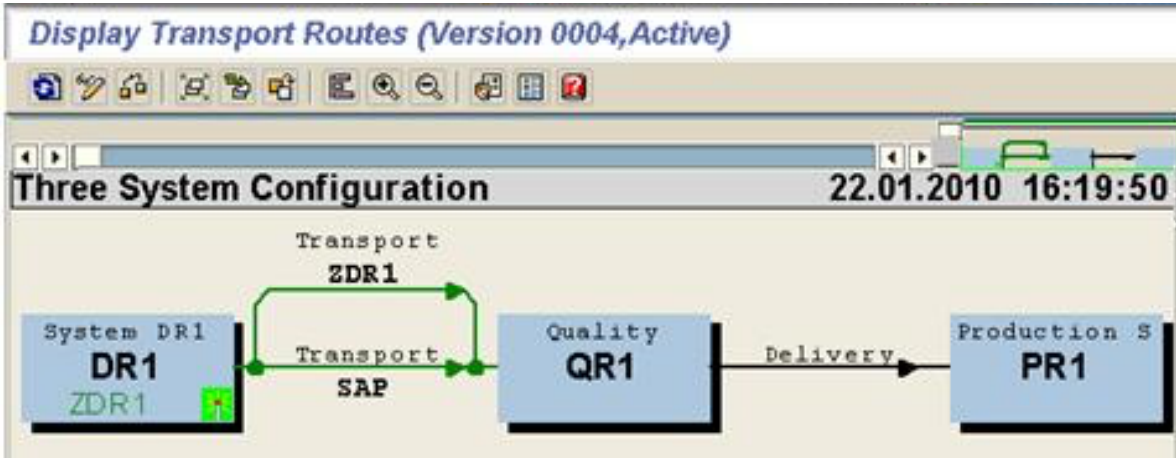
Transport Process



Note: For any given change, the **same** change is moved / migrated to **each** system. Changes are not moved from system to system.

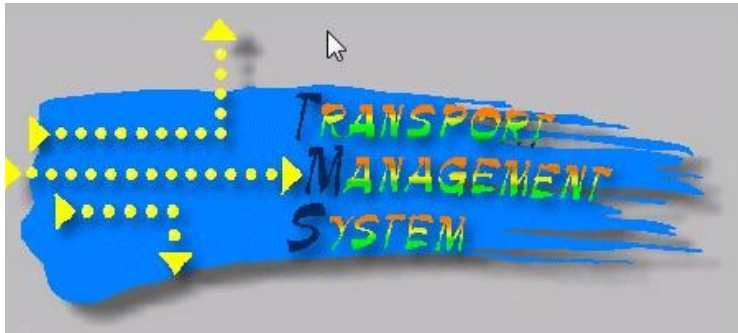
Transport Paths

- TMS Transport Routes / Paths define logical connections between the different systems in an environment
- System changes moved to systems along these pre-defined transport paths
- Paths typically defined during initial landscape design and implementation



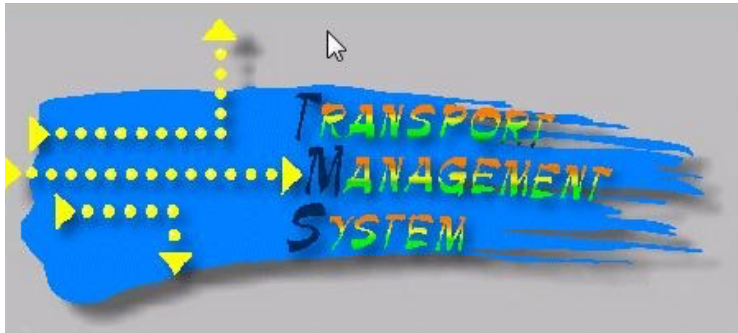
Transport Process

- Actual import occurs at the operating system level (SAP Basis)
- Administrator defines start time
- Defined start time (midnight? 4 pm, ??)
- Defined Procedure for administrator to choose requests (based on testing status, approvals, etc.)
- All transport errors must be reviewed and corrected if necessary



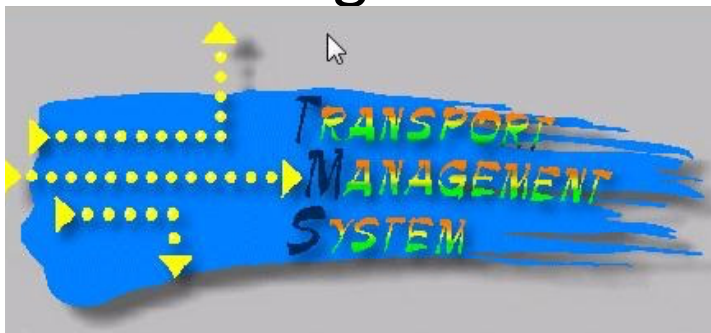
Transport Security

- Access to TMS highly restricted to system administrators
- Development classes can be associated with transports
- Segregation of duties
  - Ability to change vs. release transports
  - Ability to change / release vs. migration



Transport Controls

- Transporting changes into production access is restricted to authorized personnel via SAP Security
- All changes entering production environment adequately supported by:
  - Change approvals by appropriate personnel
  - Documentation of change (e.g. SAP Solution Manager)
  - Test results
- Review transport paths and related procedures to ensure appropriate change controls are designed and used to modify them



SAP Landscape: Instance Security

- Also referred to as ‘Application Server Parameters’
- Need to be configured on each logical instance
- Must review parameters on all application servers
- Default SAP Parameters do not provide adequate level of security
- May vary depending on business’s Security Policies

Critical Instance Profile Parameters

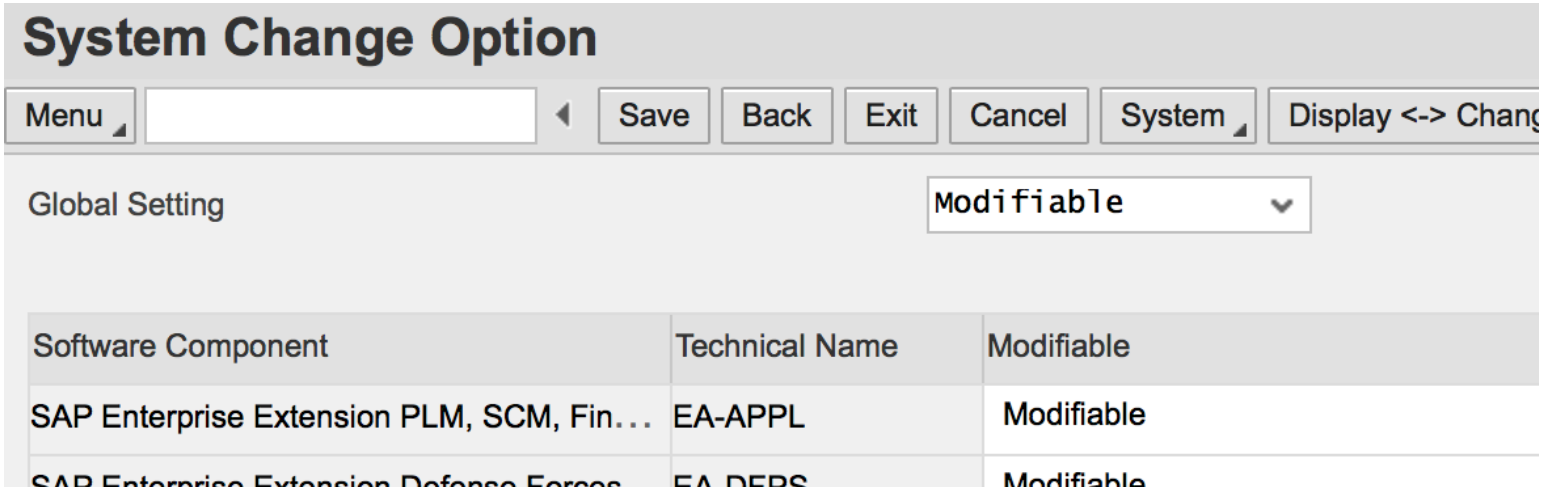
Parameter / Description	SAP Default	Recommended
Login/min_password_lng Minimum password length	3	5
Login/min_password_lng # days after which password must change	0	30-60 Days
Login/fails_to_session_end # times bad password to end session	3	3
Login/fails_to_user_lock # times bad password to lock out	12	3
Login/failed_user_auto_unlock Auto unlock of user at midnight	1 (Auto unlock)	0 (remains locked)

Critical Instance Profile Parameters

Parameter / Description	SAP Default	Recommended
Auth/rgc_authority_check Check authorization for remote function calls (Client/system to other)	0	1 (RFC's are checked)
Rdisp/gui_auto_logout # seconds to auto disconnect inactive users	0	3600
Login/disable_multi_gui_Login Block multi logon if set to 1	0	1

Setting System Change Options

- Transaction: SE06
- Changes affect entire system / instance
- Affects Client Independent objects
- PRD Global setting should be 'Not Modifiable'



Client Dependent vs. Independent

System/Instance

Client Dependent

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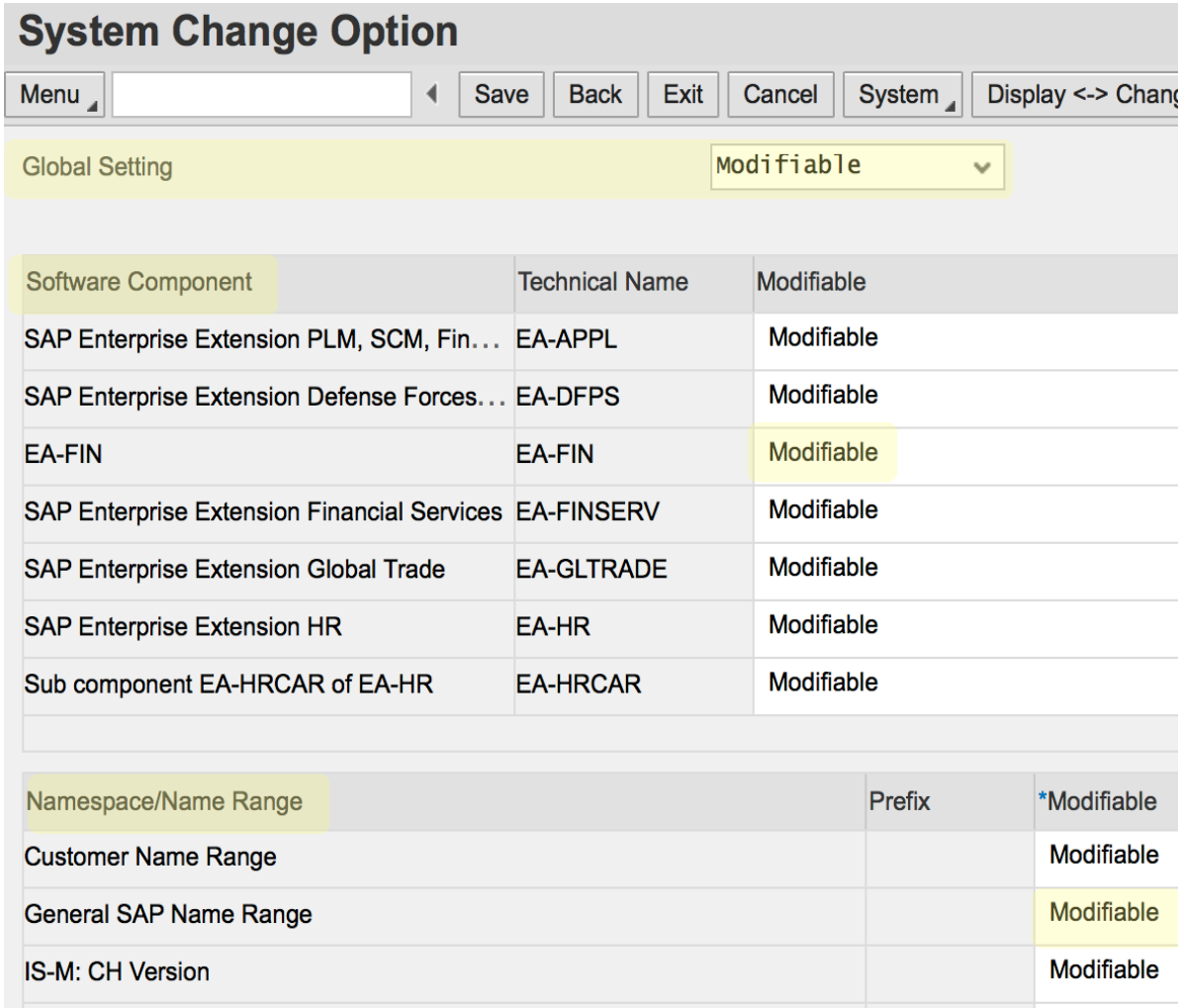
- Master Data - Transaction Data - User Management / Data	- Master Data - Transaction Data - User Management / Data	- Master Data - Transaction Data - User Management / Data	- Master Data - Transaction Data - User Management / Data

Client Independent

- **Programs (ABAP)** **> Repository Objects (Client Independent Config**
- **Data Dictionary** **- Currency, UOM's**
- **Parameters** **- Pricing Tables**
- **Authorization Objects** **> Transactions**

Setting System Change Options

- Client Independent Object Modifiable if these parameters are 'Modifiable'
  - Global Setting
  - Software component of object
  - Namespace or Name Range



Setting System Change Options

- Transaction: SE06

		Software Component		
		Modifiable	**Restricted**	**Not Modifiable**
Namespace	**Modifiable**	Existing Objects can be changed	Existing objects can be repaired	
		New objects have SAP System ID of original System	New objects have SAP System ID of original System	
	Not Modifiable	***No Changes Possible***		

Risk and Recommendation
Instance Profile Parameters

Risks:

SAP Default settings do not provide adequate control over system.
Settings not configured could result in system's security being compromised and unauthorized access

Recommendations:

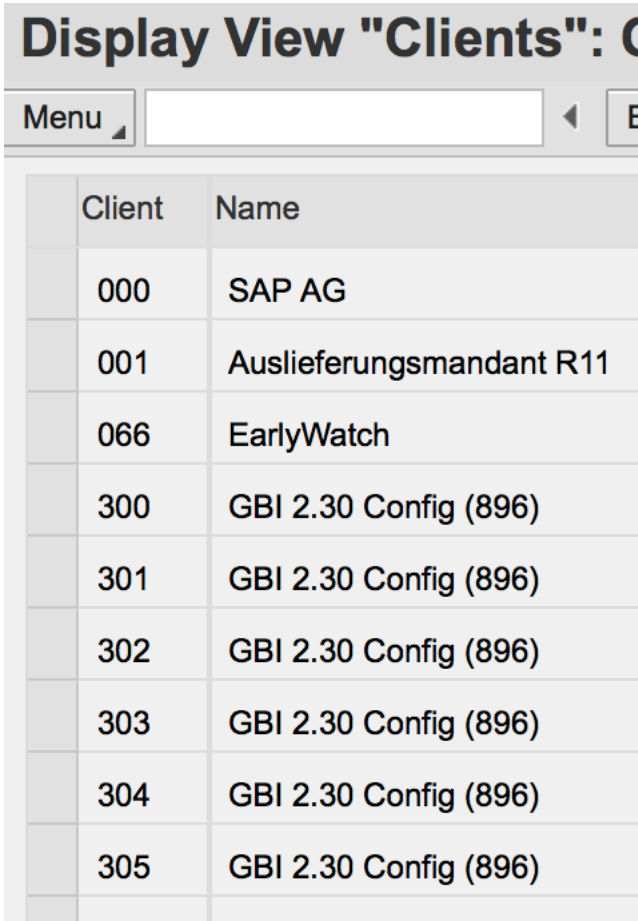
Review all parameter values different than recommended – understand why company has chosen non-recommended value

PRD (Production) Instance Security

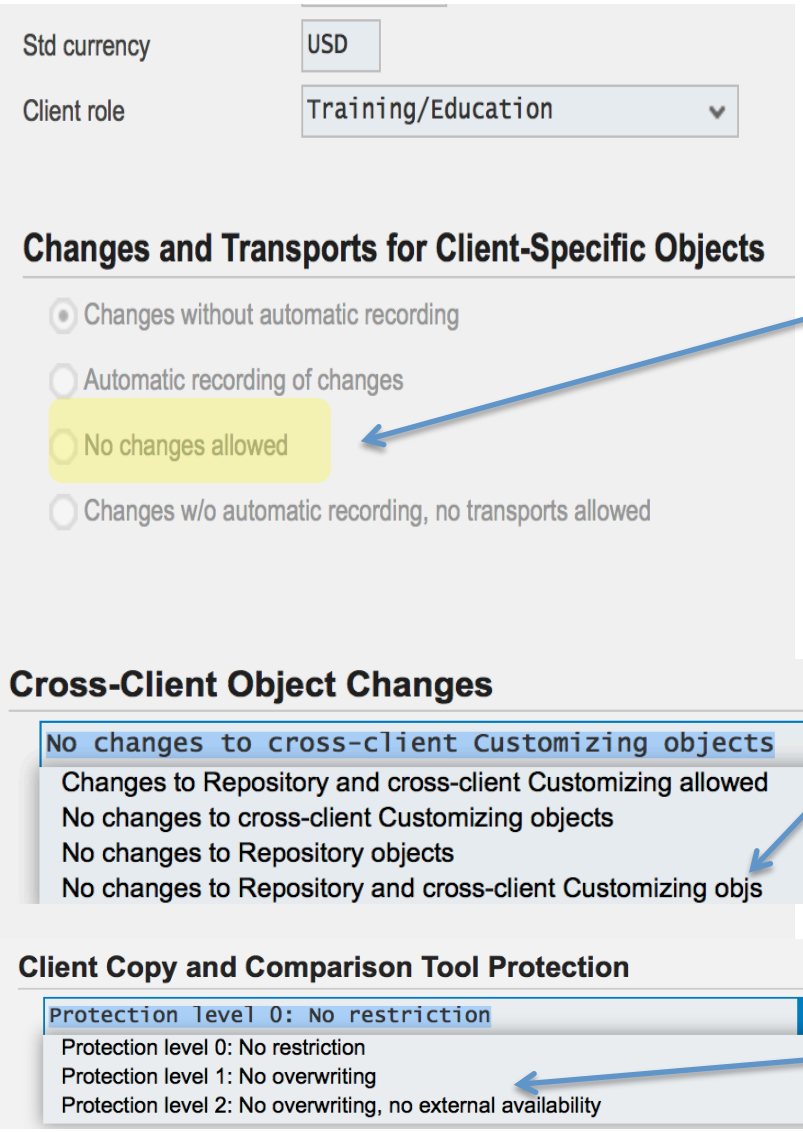
- Focus of audits are the PRD System
- PRD often the standalone environment referred to as the 'Live' system
- Only thoroughly tested configuration changes should be transported to PRD to assure integrity of this environment
- No configuration access should be allowed in PRD
- Direct changes in PRD (Occasionally required) handled with strict policies, procedures, approvals.

Setting System Security: Clients

- Transaction: SCC4
- Settings for all clients in an instance
- May be different btw DEV & PRD
- PRD should be ‘No Change Allowed’
- Options authorized per security Policy / Procedures
- Only system administrator able to change options
- Process for system open/close
  - Defined / Documented
  - Rarely used
  - Closely Monitored



Setting System (Client) Security



Recd: 'No Changes Allowed' in PRD to prevent unauthorized changes to Client-specific objects

Recd: 'No Changes to Repository and Cross-client customizing Objs' in PRD to prevent unauthorized changes to Client-independent objects

Recd: Level 1 or 2 in PRD to prevent overwriting when using client copy or client comparison tools

Change Management / Transport Management Overview

- Client dependent vs. Client independent objects / components
- Transport Process
  - Transports
  - Transport Paths
  - Activities
  - Controls
- Instance / Client Security: Risks & Recommendations

Assignment Questions

- How do clients in the SAP system fit in the change management process?
- When we audit, how we could know if it is the right "change management" to detect the fraud?
- What is the relation between change management and the development life cycle of software?
- Why is it difficult to make changes to a live SAP system or any business application?
- Do you think change management could be successful without full documentation? Why or why not?
- What is the reason for dearth of know-how in SAP Solution Manager (SM) implementation? Why would organizations not take advantage of the free offer and direct funds for training and talent? If absence of SAP Solution Mgr means negative audit finding, does that mean it is mandatory?
- Considering SAP's design and what we know about it and what we know about the role of IT departments, does SAP provide sufficient general IT controls either explicitly or by design? How so?

ERP Systems and Shared Services

Shared Service Models

- What are they?
- Why Use / Implement?
- Goals?

Shared Service Models (One Taxonomy)

- Outsourcing: Sending job functions outside organization (vs. in-house)
  - Off-shore: Services performed offshore
  - Near-shore / On-shore: Services performed outside but relatively nearby
- Insourcing: delegating work to internal resources (vs. outsourcing)
- Co sourcing: Collaborative partnering (shared risk?)
- Mixed models

Shared Service Controls ?'s

- How can I better define my audits in the new environment?
- Do the controls now reside at the SSC or in the business units?
- Are the processes and templates used across the SSC consistent? Do work-arounds proliferate?
- Can I use automation in the audit process more effectively now that I am auditing in an SSC environment?
- What is the steady state assurance strategy? (Who will provide monitoring and assurance, and what is the scope?)
- What audit clauses exist contractually for a SSC?
- Are you able to measure risk exposure for each service provider?
- Does a steady state governance structure exist to manage the shared services and the outsourcing arrangements?

SSC: Shared Service Center

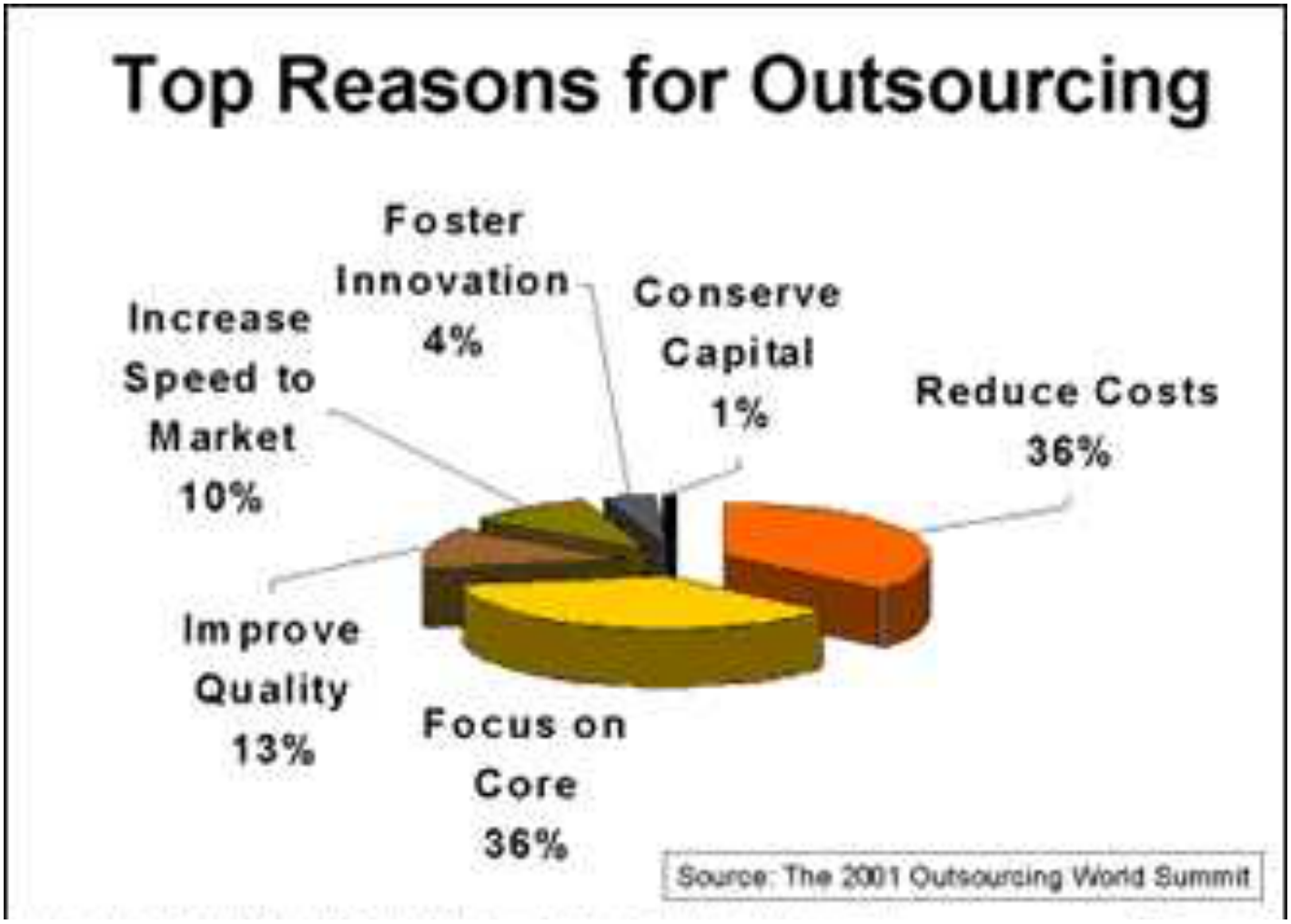
Shared Service Management Principles (ENB)

- The operations of the process in SSC can be delegated to a service organization
  - Contractual commitments
  - Defined Goals and SLA's (Service Level Agreements)
  - Cooperative management
- Control mechanisms in SSC run processes ultimately remain the **responsibility** of the business / client
  - SSC can administer and monitor process controls
  - Design and ultimate sign-off by the business / client
- Process Design of critical processes must be 'owned' by the business / client

Shared Service Management Principles (ENB)

- Certification by SS provider is useful
  - Independent assessment / evaluation
  - Defined measures & standards
  - Business / Client needs to understand what certification means / doesn't
- Process / Expectation Documentation is critical
- Define the strategic reasons for the SS Change –Align to business goals
- Benchmark wherever possible
- On-going Assessment / Process Improvement Mindset

ERP Systems and Shared Services



ERP Systems and Shared Services

- 2+ Principles

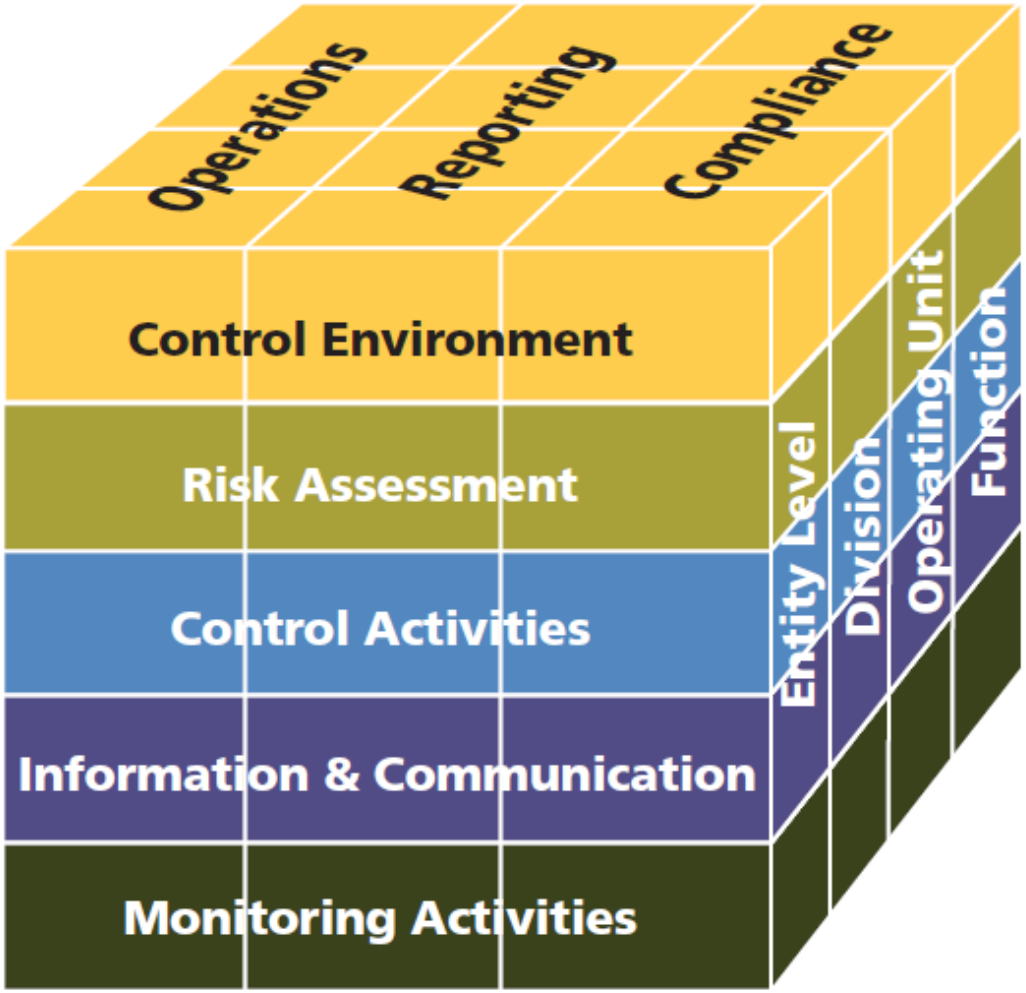
Assignment Questions

- How to monitor the outsourced controls? Is there a specific function controlling that in SAP?
- Can SAP configuration include certification requirements?
- Can an organization rely on the outsourcer SLAs and contract terms to support its own internal control environment? What precautions should be taken into account?
- How often should an SLA agreement be reviewed?
- Would you outsource and displace a lot of employees to save a dollar?
- I have a general idea from the reading of ISAI 3402 and SAS 70. As an auditor, would need to know in great detail? Specifically the control mechanisms within each and how they can be applied to SAP ERP.
- When we outsource the IT functions, what frameworks and controls are used to manage vendor risks? Which one is the most effective?

Break Time

Risk / Control Matrix
Final Exercise

COSO Framework (2013)



COSO Framework (2013)

Codification of 17 principles embedded in the original Framework

Control Environment	1. Demonstrates commitment to integrity and ethical values 2. Exercises oversight responsibility 3. Establishes structure, authority and responsibility 4. Demonstrates commitment to competence 5. Enforces accountability
Risk Assessment	6. Specifies relevant objectives 7. Identifies and analyzes risk 8. Assesses fraud risk 9. Identifies and analyzes significant change
Control Activities	10. Selects and develops control activities 11. Selects and develops general controls over technology 12. Deploys through policies and procedures
Information & Communication	13. Uses relevant information 14. Communicates internally 15. Communicates externally
Monitoring Activities	16. Conducts ongoing and/or separate evaluations 17. Evaluates and communicates deficiencies

Risk / Control Matrix: Final Exercise

Parts

1. Analyze and define the key risks that exist for the Order to Cash (OTC) process at GBI
2. Guided by the risks you identified (esp. the High Severity and High Likelihood / Frequency risks) identify the key controls that will be used in the OTC process.
3. Link the Risks from Part 1 to the controls in Part 2.
4. Complete definition of the controls (classifications, links to assertions, etc.)
5. Write auditable control process documentation for 1 manual and 1 automated (configuration) control identified.
6. (Individual vs. Team submission): Couple questions about your work as a team to complete this a other exercises.

Risk / Control Matrix: Final Exercise

- Agenda
  - This Class *(April 6)*: Part 1 (Identify Risks)
  - Future Class *(April 13)*: Part 2, 3 (Identify Controls, Link Controls to Risks)
  - Future Class *(April 20)*: Part 4 (Complete Control Definitions)
  - Future Class *(April 27)*: Part 5, 6 (Control Process / Audit Details; Personal Questions)
  - *Due April 30 11:59 PM:* Assignment Submission

Risk / Control Matrix: Final Exercise

Part 1:

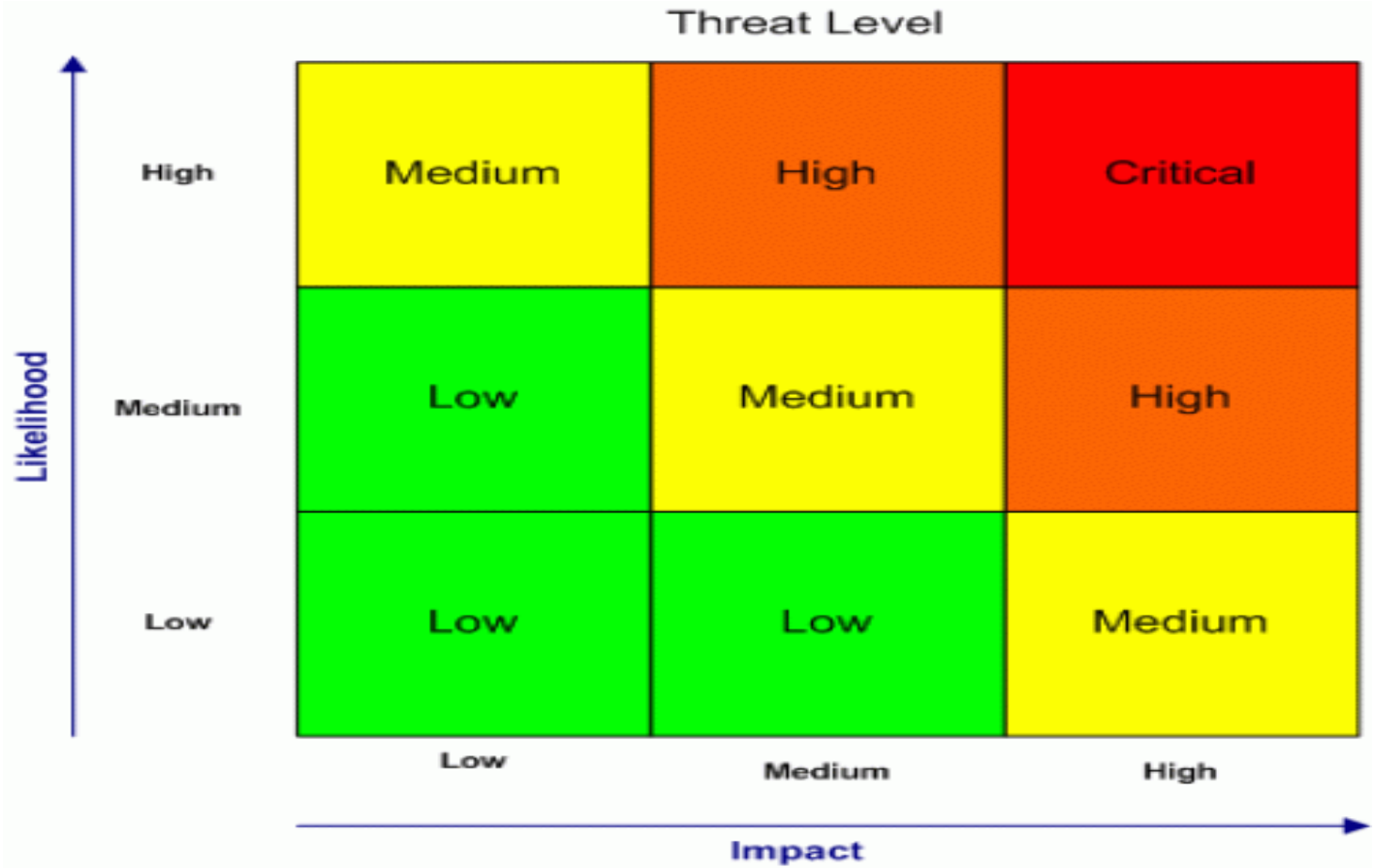
a) Analyze the key risks that exist for the Order to Cash (OTC) process at GBI

b) Define and document the key risks that exist for the Order to Cash (OTC) process at GBI

- Tab: Part 1 – GBI Risks
- Identify at minimum 25 risks in the process
- Identify a minimum 4 risks in each of the OTC sub-processes:
  - ✓ **OR&H**: Order Receipt and Handling
  - ✓ **MF**: Material Flow (shipping)
  - ✓ **CI**: Customer Invoicing
  - ✓ **PR&H**: Payment Receipt and Handling

Extra Slides

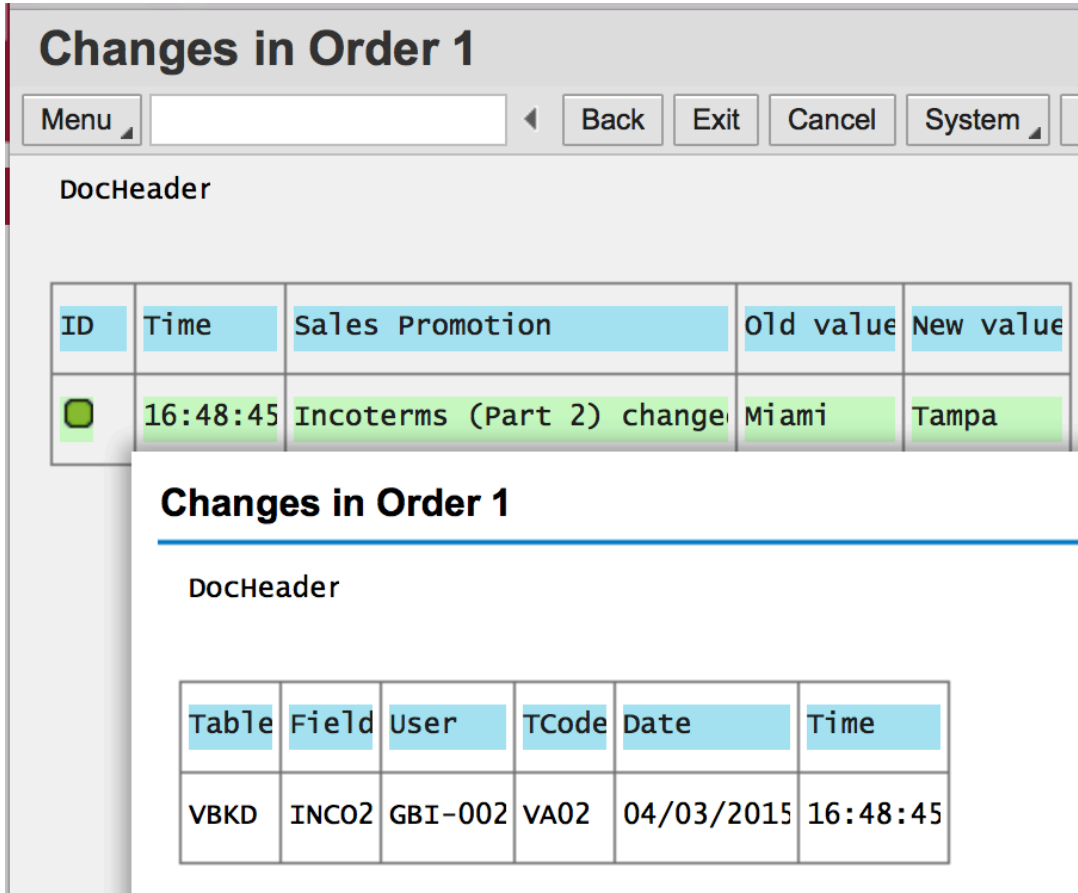
Extra Slides



Risk Assessment

Change Documents

- Change ‘log’ stores information on changes made to master data and transaction data via standard transactions (Miss direct table maintenance changes)
- Permanent record and audit trail for transactions executed in SAP



Risk and Recommendation
Change Documents

Risks:

If users are not restricted from maintaining change documents, the system audit trail from changes documents could be deleted accidentally or via malicious intent

Recommendations:

Users in production have activity level of security object S_SCD0 set to '08' (Display Change Documents).

Investigate ways access to maintenance of change documents could be further restricted (locking transaction)