Internal Auditor Primer: Oracle E-Business Suite Security Risks Primer

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Background

Speaker

Stephen Kost

- CTO and Founder
- 16 years working with Oracle
- 12 years focused on Oracle security
- DBA, Apps DBA, technical architect, IT security, …

Company

Integrigy Corporation

- Integrigy bridges the gap between databases and security
- Security Design and Assessment of Oracle Databases
- Security Design and Assessment of the Oracle E-Business suite
- AppSentry - Security Assessment Software Tool

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Integrigy Security Alerts

Security Alert	Versions	Security Vulnerabilities
Critical Patch Update July 2008	**Oracle 11g** **11.5.8 – 12.0.x**	▪ 2 Issues in Oracle RDBMS Authentication ▪ 2 Oracle E-Business Suite vulnerabilities
Critical Patch Update April 2008	**12.0.x** **11.5.7 – 11.5.10**	▪ 8 vulnerabilities, SQL injection, XSS, information disclosure, etc.
Critical Patch Update July 2007	**12.0.x** **11.5.1 – 11.5.10**	▪ 11 vulnerabilities, SQL injection, XSS, information disclosure, etc.
Critical Patch Update October 2005	**11.5.1 – 11.5.10** **11.0.x**	▪ Default configuration issues
Critical Patch Update July 2005	**11.5.1 – 11.5.10** **11.0.x**	▪ SQL injection vulnerabilities ▪ Information disclosure
Critical Patch Update April 2005	**11.5.1 – 11.5.10** **11.0.x**	▪ SQL injection vulnerabilities ▪ Information disclosure
Critical Patch Update Jan 2005	**11.5.1 – 11.5.10** **11.0.x**	▪ SQL injection vulnerabilities
Oracle Security Alert #68	**Oracle 8i, 9i, 10g**	▪ Buffer overflows ▪ Listener information leakage
Oracle Security Alert #67	**11.5.1 – 11.5.8** **11.0.x**	▪ 10 SQL injection vulnerabilities
Oracle Security Alert #56	**11.5.1 – 11.5.8** **11.0.x**	▪ Buffer overflow in FNDWRR.exe
Oracle Security Alert #55	**11.5.1 – 11.5.8**	▪ Multiple vulnerabilities in AOL/J Setup Test ▪ Obtain sensitive information (valid session)
Oracle Security Alert #53	**10.7, 11.0.x** **11.5.1 – 11.5.8**	▪ No authentication in FNDFS program ▪ Retrieve any file from O/S

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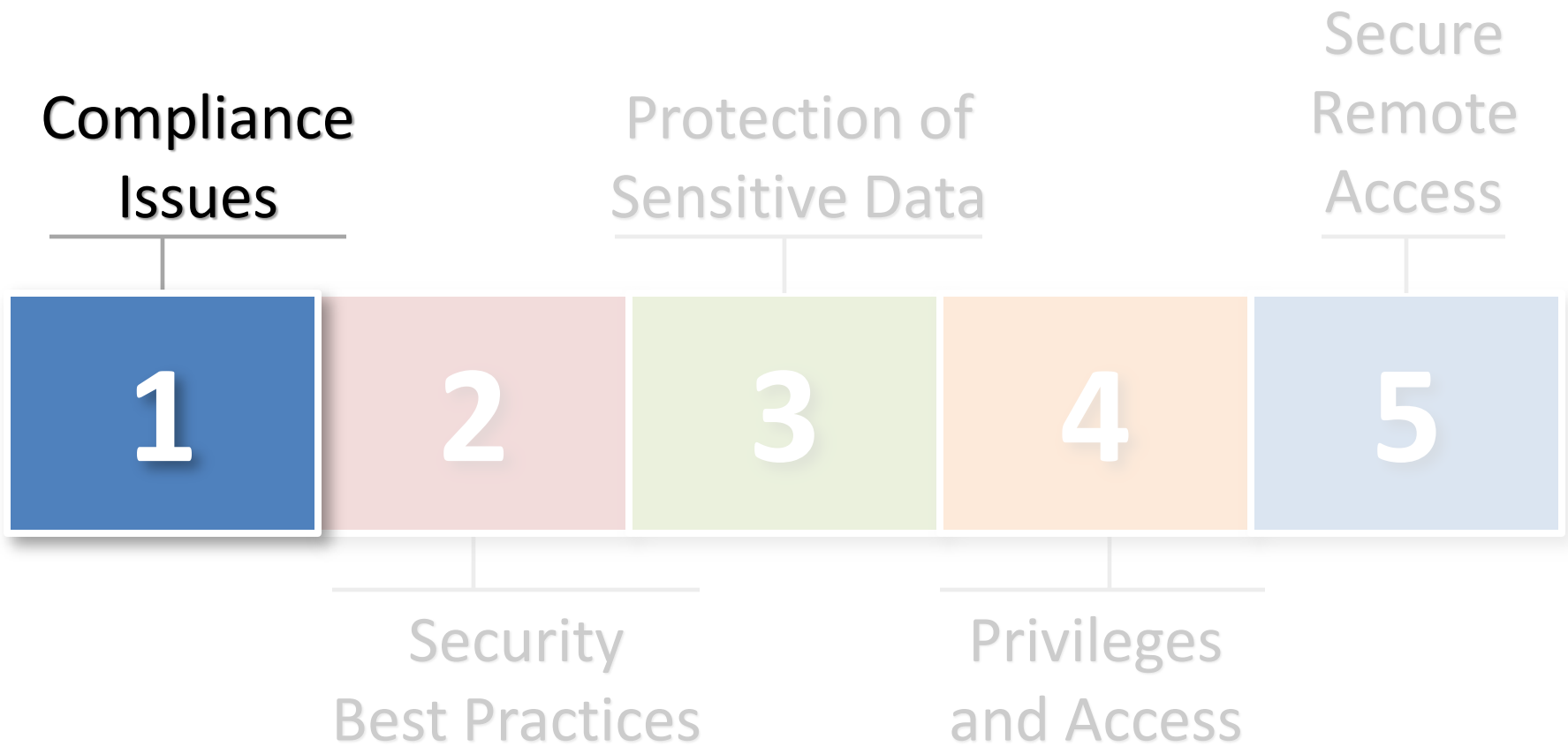

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Security and Compliance Drivers

- **Sarbanes-Oxley (SOX)**
  - Database object, structure, and configuration changes
  - User and privilege creation, deletion, and modification
  - Reports for sampling of changes to change tickets
- **Payment Card Industry - Data Security Standard (PCI-DSS)**
  - 12 stringent security requirements
- **Privacy (National/State Regulations)**
  - Read access to sensitive data (National Identifier and Bank Account Number)
  - California and Massachusetts data privacy laws
- **Business Audit and Security Requirements**
  - Internal adoption of COBIT or COSO
  - Preventative and detective controls

PCI-DSS – Compliance Effort

#	Requirement	OS/Network	Oracle DB	Oracle EBS
1	Use Firewall to protect data	1		
2	Do not use vendor-supplied defaults	3	3	2
3	Protect stored cardholder data			6
4	Encrypt across open, public networks	1		
5	Use Anti-virus software	1		
6	Develop and maintain secure applications	1	3	5
7	Restrict access to cardholder data		2	2
8	Assigned unique IDs for access	3	4	4
9	Restrict physical access to data			
10	Track and monitor access	7	6	6
11	Regularly test security	2	1	1
12	Maintain information security policy			

High Medium Low

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PCI-DSS Compliance Example

- **PCI 6.1 – "*Ensure that all system components and software are protected from known vulnerabilities by having the latest vendor-supplied security patches installed. Install critical security patches within one month of release.*"**

- **Few Oracle customers install patches within 30 days**
- **Most customers are 1 to 2 quarters behind**
- **Business must prioritize applying security patches – effort to functionally test and apply, down-time**

- **See Integrigy Whitepaper "Oracle Applications 11i: Credit Cards and PCI Compliance Issues"**

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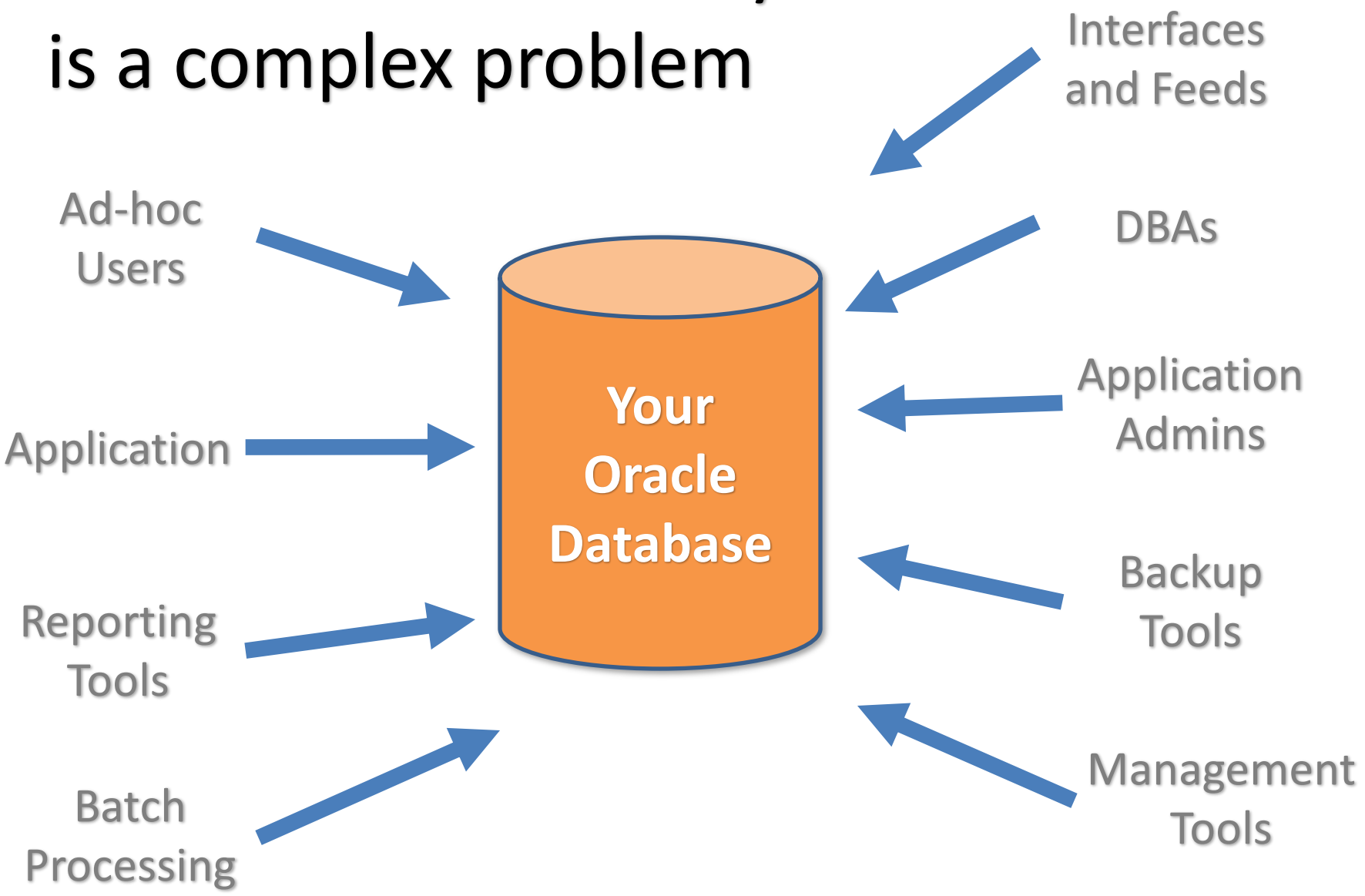
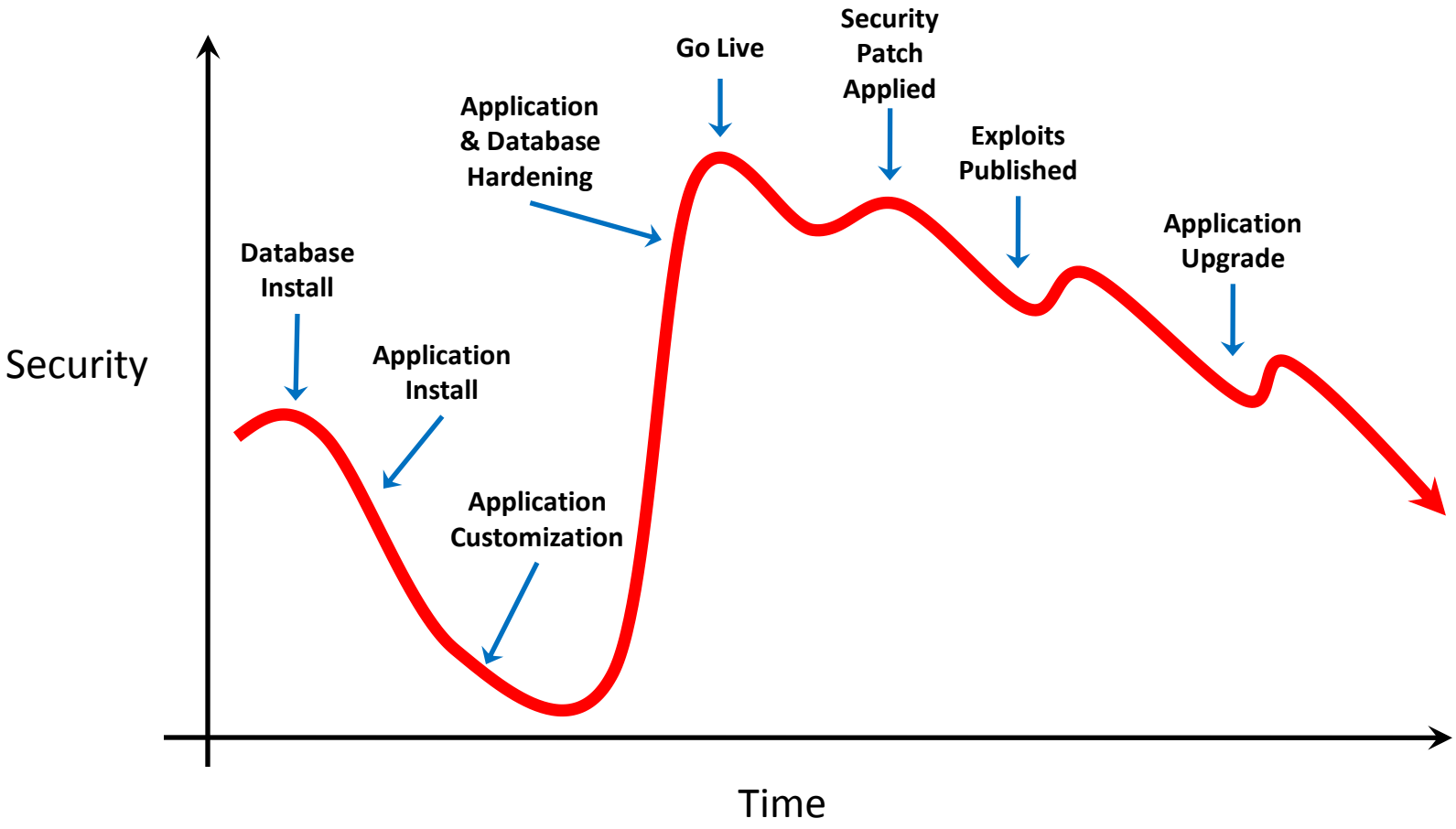
Database connectivity is a complex problem



Database security **decays** over time



Organizational Misalignment

- **IT Security**
  - Excellent at network and operating system security
  - Limit or no understanding of database security
  - Securing Oracle EBS is different than networks and operating systems – SQL, application architectures, data warehousing, etc.
- **Risk Management**
  - Database risk not properly quantified
  - Data classification not extended to caretaker of data
  - Databases and applications poor at handling data classification
- **Database Administrators (DBAs)**
  - Not aware of security requirements nor security-focused
  - No time to properly secure the database and application
  - Always afraid of impacting the application or performance of the database

Default Oracle Password Statistics

Database Account	Default Password	Exists in Database %	Default Password %
SYS	CHANGE_ON_INSTALL	100%	3%
SYSTEM	MANAGER	100%	4%
DBSNMP	**DBSNMP**	**99%**	**52%**
OUTLN	**OUTLN**	**98%**	**43%**
MDSYS	MDSYS	77%	18%
ORDPLUGINS	ORDPLUGINS	77%	16%
ORDSYS	ORDSYS	77%	16%
XDB	CHANGE_ON_INSTALL	75%	15%
DIP	DIP	63%	19%
WMSYS	WMSYS	63%	12%
CTXSYS	**CTXSYS**	**54%**	**32%**

* Sample of 120 production databases

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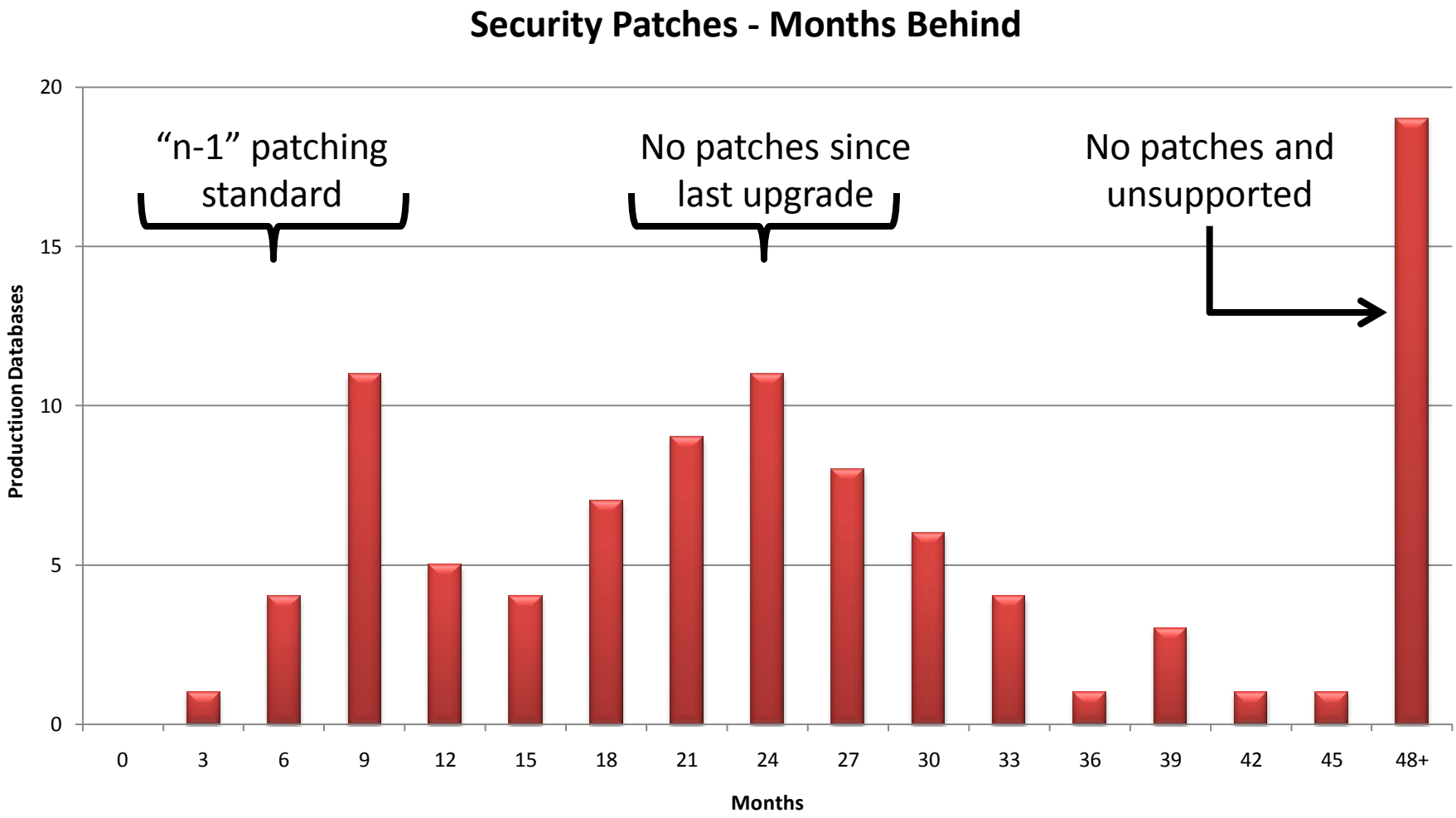
Oracle CPU Patching Metric



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Key Security Risks

1 Exploitation of Oracle security vulnerabilities

- Apply security patches
- Limit direct connectivity to the database
- Prohibit use of generic accounts by individuals

2 Brute forcing of Oracle database passwords

- Limit access to password hashes
- Change all database passwords in test and development

3 Decryption of Oracle EBS passwords

- Apply latest Oracle EBS password patches
- See Integrigy whitepaper for recommendations

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Oracle EBS Security Recommendations

- **Adhere to the Oracle Best Practices for Oracle EBS security**
  - See Metalink documents 189367.1 and 403537.1
  - Written by Integrigy
  - Oracle has not updated since 2007
- **Perform periodic security reviews and assessment**
  - Validate compliance against security best practices

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Protecting Sensitive Data

- **Database access is a key problem**
  - APPS_READ
- **All data duplicated in development and test databases**
  - Data not always scrambled in non-production database
- **Limited data encryption capabilities**
  - No third-party encryption solutions work effectively
  - Oracle EBS only natively encrypts credit card numbers
  - Need to encrypt sensitive data on backup media
- **Data and transaction retention policy**
  - Oracle EBS is “data in” for life
  - Seldom data is purged or archived unless for performance
  - PCI Compliance = 1 to 2 years recommended retention

Key Data Protection Risks

1 Sensitive data accessible in test & development

- All sensitive data must be scrambled in all non-production databases
- Must periodically review database for instances of non-scrambled data as often in custom, interface, and temporary tables

2 Access to sensitive data by generic accounts

- Granularity of database privileges, complexity of data model, and number of tables/views make it difficult to create limited privilege database accounts
- Must use individual database accounts with roles limiting access to data along with other security

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Oracle Credit Card Encryption

- **Use the Oracle E-Business Suite encryption**
  - Application-level encryption
  - Better solution than other technologies such as Oracle Transparent Data Encryption (TDE)
- **Metalink Note ID 338756.1, Patch 4607647**
  - Consolidates card numbers into IBY_SECURITY_SEGMENTS table
  - Encrypts card numbers in IBY_SECURITY_SEGMENTS
  - Uniform masking of card numbers
  - Significant functional pre-requisites (11.5.10.2)

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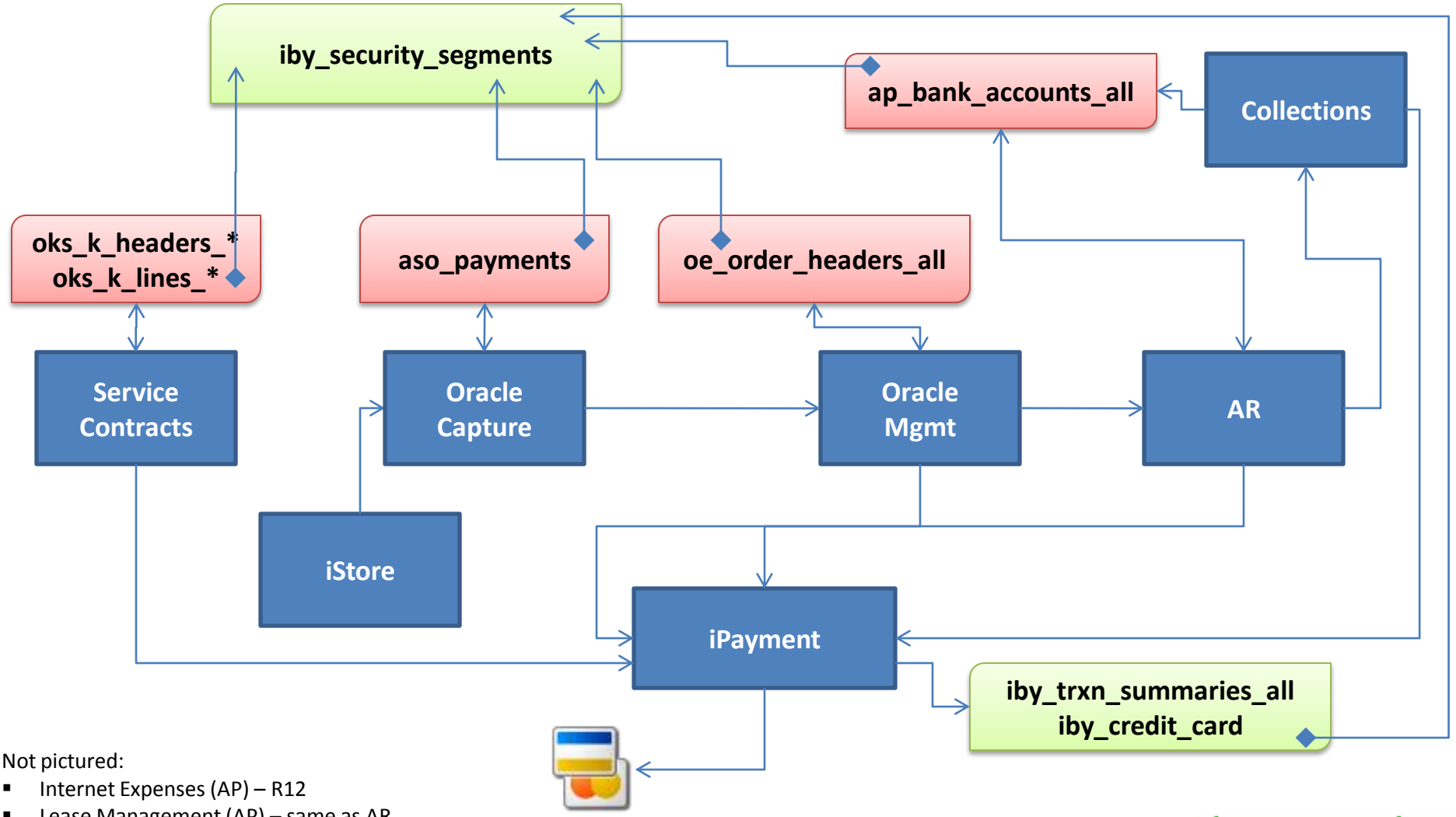
Oracle Credit Card Encryption Design



Not pictured:

- Internet Expenses (AP) – R12
- Lease Management (AP) – same as AR
- Student System (IGS) – IGS patch

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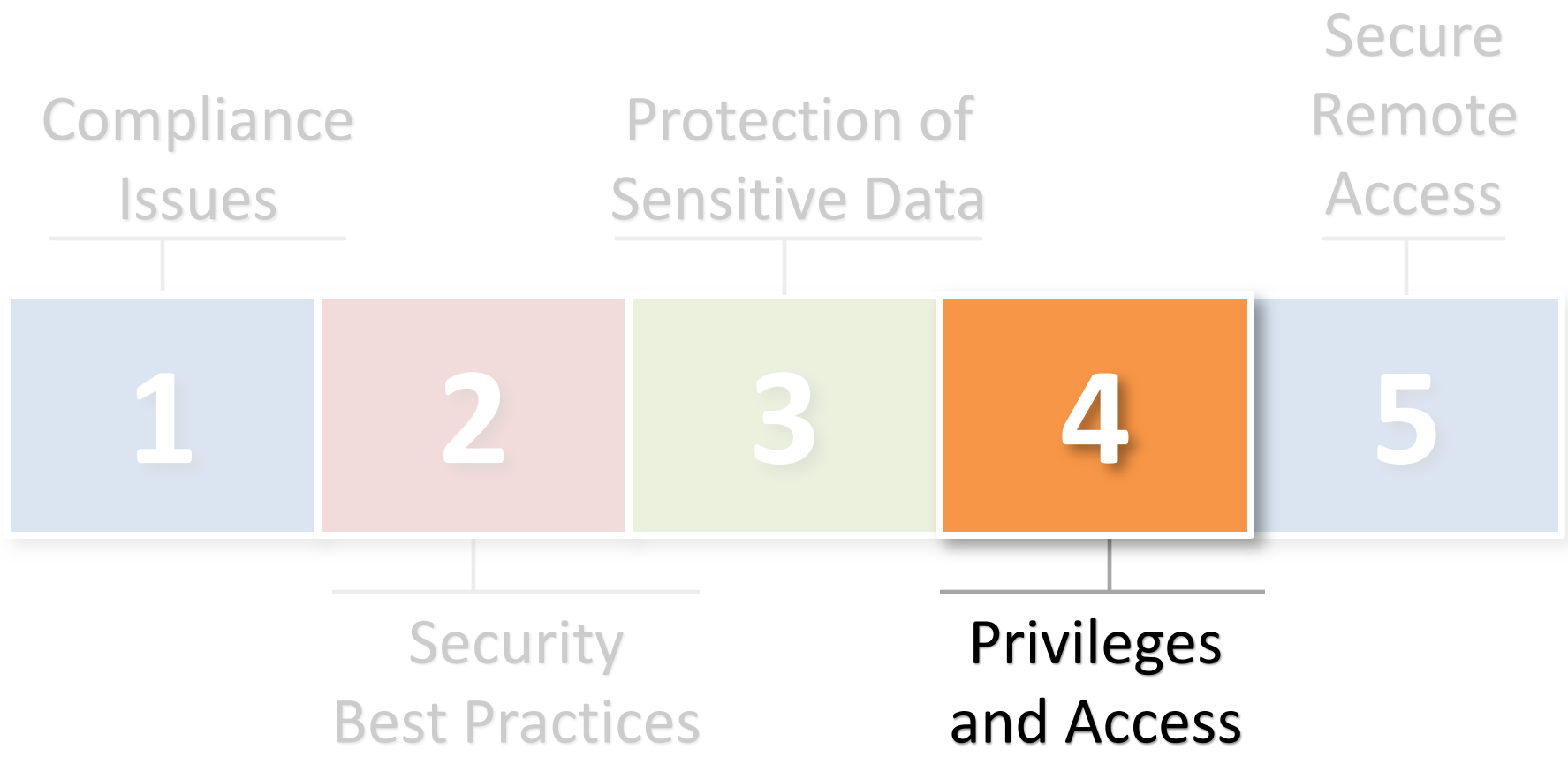

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Privileges and Access in Oracle EBS

- **Many generic and privileged accounts in application and database**
  - **Database - APPS, SYS, SYSTEM, APPLSYS, …**
  - **Application - SYSTEM, GUEST**
  - DBAs must use generic accounts for many maintenance activities
  - Generic application accounts used for scheduling key batch processes
- **Database access is a key problem (Again)**
  - Generic accounts are often used for ad-hoc database access
  - APPS_READ
- **Limited auditing and control over the use of generic accounts**
  - No auditing is enabled by default in database or application
  - Auditing on transactions often a major performance impact

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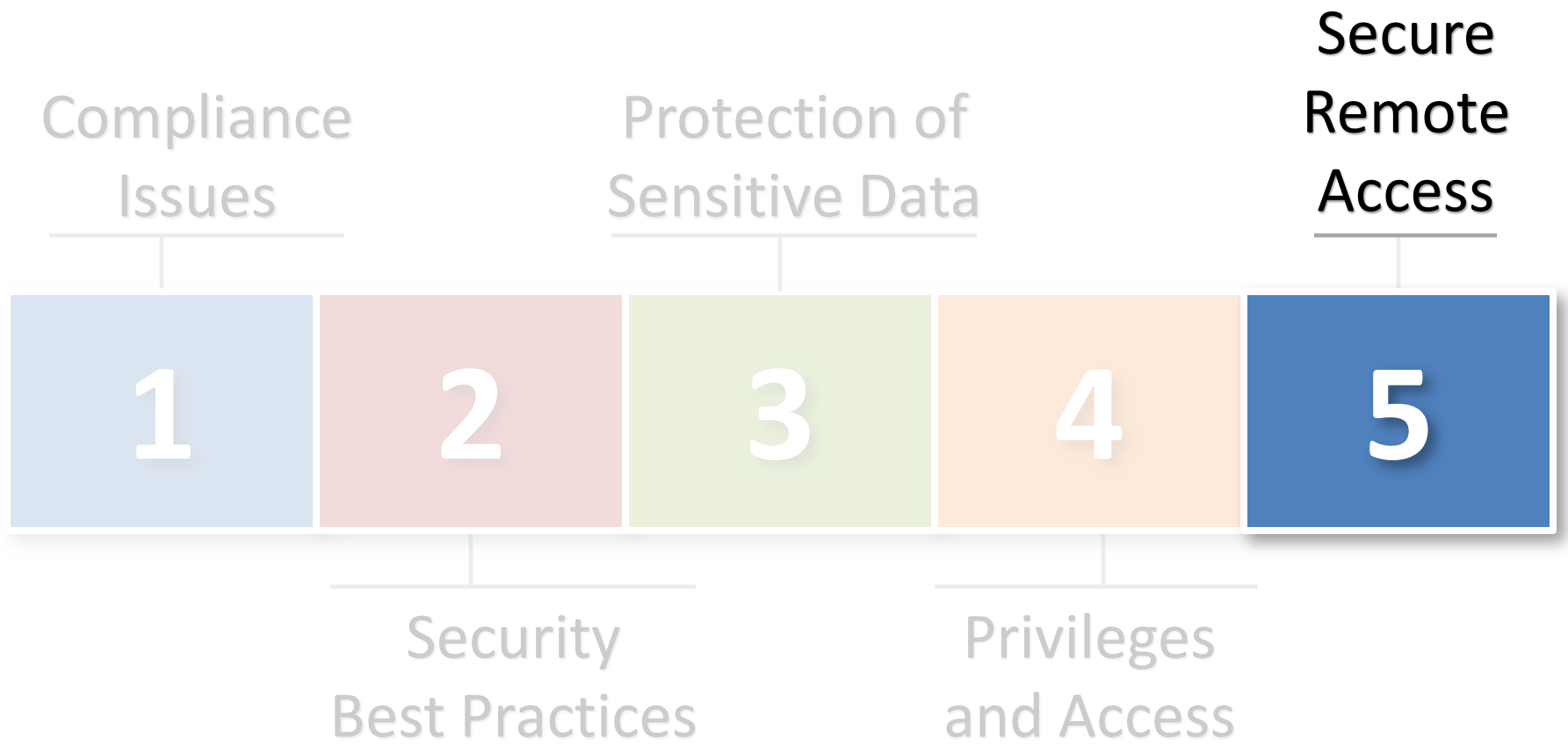

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External Access to Oracle EBS

- **Oracle EBS has certified "DMZ" modules for external access**
  - iStore, iSupplier, iSupport, iRecruitment, etc.
  - Only certified modules should be externally accessible
- **Oracle EBS never designed as a external web application**
  - All modules (250+) always installed
  - 40,000+ web pages are available even though not configured, licensed or used
  - If there is a security vulnerability, web application has access to all data

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Key External Access Risks

1 Oracle EBS web architecture has inherent security weaknesses and deficiencies

- Configuration for external is very specific and blocks access to major parts of the application
- Must follow every step in Metalink documents 380490.1 (R12) and 287176.1 (11i)

2 Exploitation of Oracle security vulnerabilities

- Risk is significantly different if Oracle EBS is externally accessible (internal network vs. world)
- Firewalls and other security tools are ineffective
- Application security patching is critical

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Summary

- **Oracle E-Business Suite security and compliance requires a team effort**
  - DBAs, IT Security and Internal Audit must work together to ensure a secure and compliant environment
- **Security is constantly changing due to application changes and new risks**
  - Periodic reviews and assessments are required
- **Security vulnerabilities must be addressed**
  - The business must prioritize security patches
- **No “silver bullet” exists for protecting the Oracle EBS**
  - A combination of policies, procedures, reviews, and tools must be put in place to address this complex environment

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References and Resources

- **Integrigy's Website**
  - www.integrigy.com
  - Oracle E-Business Suite Security Whitepapers
- **Oracle Best Practices for Securing Oracle EBS**
  - Metalink Note IDs 189367.1 and 403537.1
- **ERP Risk Advisors Oracle Internal Controls and Security List Server**
  - http://groups.yahoo.com/group/OracleSox
- **ERP Risk Advisors Internal Controls Repository**
  - http://tech.groups.yahoo.com/group/oracleappsinternalcontrols
- **Jeff Hare's Book**
  - *Oracle E-Business Suite Controls: Application Security Best Practices*
- **ISACA Book**
  - *Security, Audit and Control Features Oracle E-Business Suite*

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Questions?

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For information on -

- Oracle Database Security
- Oracle E-Business Suite Security
- Oracle Critical Patch Updates
- Oracle Security Blog

www.integrigy.com

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