FEATURE

Information Security Architecture

Gap Assessment and Prioritization

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A top-down approach to enterprise security architecture can be used to build a business-driven security architecture.[1] An approach to prioritizing the security projects that are identified as part of architecture assessment while ensuring business alignment follows.

Business risk and attributes can be used to identify relevant security controls and a maturity assessment can be performed to identify the current and desired maturity level of those controls and build an action plan. The steps can be summarized as follows:[2]

1. Select a security framework that is relevant to business such as those developed by the Payment Card Industry (PCI), the US National Institute of Standards and Technology (NIST) or the International Organization for Standardization (ISO).
2. Understand and document business goals and attributes.
3. Identify the framework controls that are relevant to business and can be verified by business risk.
4. Adjust and customize the controls based on business requirements and operation.
5. Perform a gap analysis and maturity assessment to identify what is missing or incomplete.
6. Develop a program to implement the missing or incomplete controls.

Figure 1—Security Architecture Life Cycle

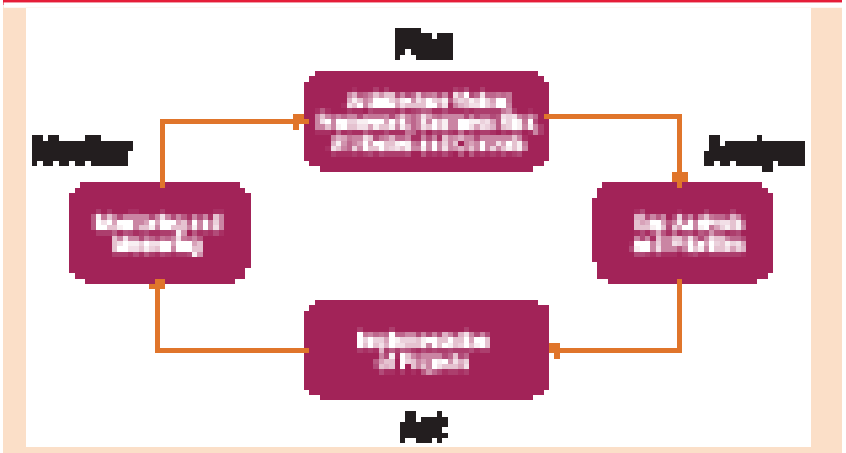

Figure 1 is a summary of these steps and a visual representation of the architecture life cycle.

Architecture Framework and Gap Assessment

Using frameworks such as COBIT® or ISO 27001 can help identify a list of relevant security controls that can be used to develop a comprehensive security architecture that is relevant to business.

COBIT® 5 for Information Security[3] covers the services, infrastructure and applications enabler and includes security architecture capabilities that can be used to assess the maturity of the current architecture.

Figure 2 illustrates an example of how service capabilities and supporting technologies in COBIT can be used to build a security architecture framework and controls. All identified controls should relate to business risk and attributes.

Maturity Assessment

Once the security architecture framework is developed and the gaps are identified, the next step is to create an implementation plan and specify priorities. This would normally be a long-term program, depending on the size and budget of the organization. This is an important step in the

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Figure 2—Service Capabilities and Supporting Technologies

Service Capability	Supporting Technology	Benefit
Provide information security escalation service.	• Vulnerability management • Information security vendor advisories • Industry information security advisories • Escalation hierarchy system (organizationally based) • Information security policies	Timely resolution of information security-related incidents by establishing a hierarchical path for escalation
Provide information security forensics (analysis).	• Memory inspection tools • Network analyzers • Log analyzers • Application and data inspection tools • Reverse-engineering tools • Malware analysis tools • Vendor and OSS forensic tool sets • Network traffic • Malware and code snippets • Security information and event management (SIEM)	Support of the investigation and discovery of information security-related incidents

Source: ISACA, *COBIT® 5 for Information Security*, USA, 2013.

architecture life cycle and should be done carefully in alignment with business requirements. **Figure 3** shows an example of the first outcome of a gap assessment and project planning.

Maturity levels are calculated based on a number of different factors such as availability of required controls, effectiveness of the controls, monitoring of their operation and integrity, and regular optimization.

The list of controls specifies the projects and tasks that need to be done once the gaps are identified. This list could be quite long, depending on the business, and the main question is how to prioritize these tasks and projects.

Risk Management

Risk is commonly categorized into two categories: business risk and operational risk. While business risk is identified by the business and used to define security architecture controls, operational risk includes threats, vulnerabilities and new audit findings, and managing those can complement the controls that are already in place. **Figure 4** offers a view of information security risk sources, including business risk vs. operational risk.

Information security risk is normally calculated using qualitative or quantitative methods. Risk assessment techniques such as The Open Group Open FAIR[4] can be used to assess the likelihood

Figure 3—Security Control Register

Identified Control	Current Maturity Level	Desired Maturity Level	Notes
End-point malware protection	1	3	• Fifty percent of machines lack malware protection. • A host-based intrusion prevention system (HIPS) is not enabled on end points.
Data loss prevention (DLP)	0	2	• There is no DLP solution in place.
Disaster recovery (DR) plan	1	3	• The DR plan is not practiced. • The DR plan is not updated on a regular basis. • An offsite communication plan is not available.

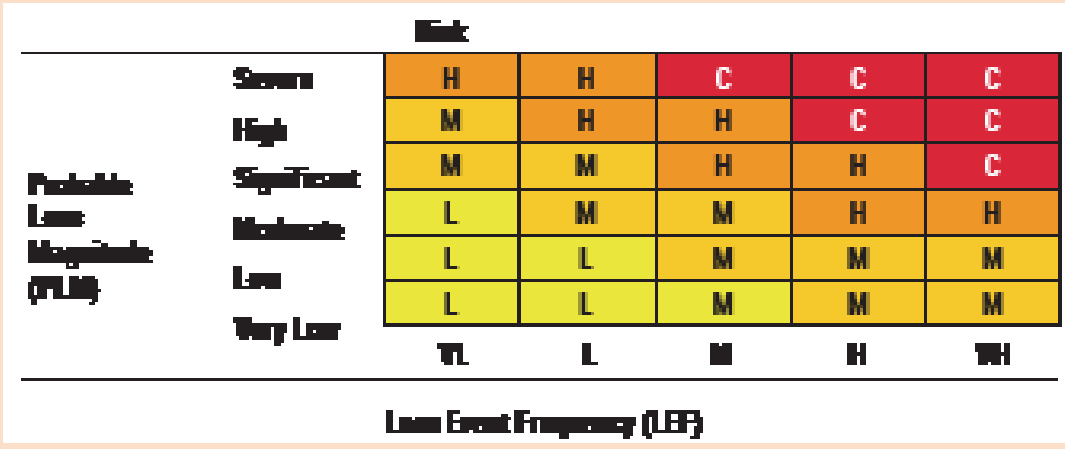
Figure 4—Risk Sources, Business Risk vs. Operational Risk

and impact of a risk, calculate a risk score, and identify the appropriate mitigation controls to remediate the risk (**figure 5**).

While not going into a deep discussion about risk management techniques and how they are done, the goal is to have a heat chart for areas of security risk, calculate a severity level for each and assign a risk score to each based on the severity level. For example, a critical risk would have a score of 5, a high risk would have a score of 4, and so on. Two important comments should be made about information security risk assessments:

1. Ultimately, all information security risk should be mapped to business risk. Any information security risk that cannot be related to a relevant business risk is not valid and would not be considered business-critical.

Figure 5—Example of a FAIR Risk Matrix



Source: J. Jones. Reprinted with permission.

Figure 6—Example of a Business Risk Register

Risk	Likelihood	Impact	Remediation Plan
Critical IT failure	Medium	High	Follow DR plan.
Intellectual property (IP) theft	Low	High	Obtain patent protection.

2. Although it would follow the same logic to prioritize the operational risk, this article focuses on and covers only prioritization of the security controls that were identified as part of the security architecture gap assessment. These controls would be used to remediate high-level business risk and would normally be taken from standard frameworks such as COBIT or those developed by ISO or NIST.

Architecture Controls Prioritization

The method used to identify priorities involves a business risk register. Every business has (or should have) a risk register in place. Normally, a business risk register captures overall business risk, its likelihood and impact on business, and a mitigation strategy.

An example of a standard business risk register is shown in **figure 6**.

A heat chart is then built using the business risk captured in the risk register, and a score assigned to each risk, as explained previously (**figure 7**).

> “NORMALLY, A BUSINESS RISK REGISTER CAPTURES OVERALL BUSINESS RISK, ITS LIKELIHOOD AND IMPACT ON BUSINESS AND A MITIGATION STRATEGY.”

To bring this into context, the two examples of risk listed in **figure 6** will have the risk scores shown in **figure 8**.

Figure 7—Risk Heat Chart

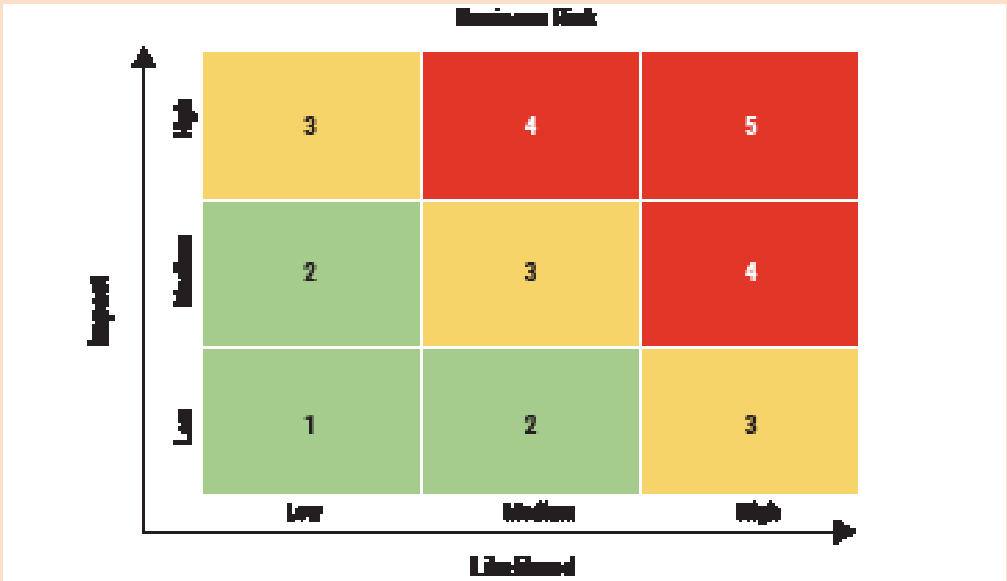


Figure 8—Business Risk Scores

Risk	Likelihood	Impact	Score
Critical IT failure	Medium	High	4
IP theft	Low	High	3

As previously explained, any of the controls identified as part of the security architecture assessment are mapped to a relevant business risk and a relevant information security risk. The business risk score and the information security risk score are used to calculate the overall risk score, as follows:

> Overall risk score = business risk score x information security risk score

This calculation is used to prioritize the implementation.

To explain this with an example, using the control register table shown in **figure 3**, **figure 9** depicts the linking of the controls to the business risk with already identified scores. In addition, assuming the control is not in place, the information security risk score is calculated separately. For example, if the end point malware protection is not in place, the risk of IP theft is quite high (5).

It should be noted that this is a very simple explanation and risk management techniques such as Open FAIR may need a bit more effort to calculate the risk score, but the approach would stay the same.

Using this method, it is easy to prioritize controls or projects and plan their implementation properly. This is useful expertise in managing the architecture life cycle. It will ensure the alignment of security and business priorities and automatically justify them.

In the example shown in **figure 9**, the priority of implementing an end-point malware protection system is much higher than having a DLP solution in place.

Conclusion

Using a business risk register to prioritize security projects is an appropriate approach that not only justifies the life cycle management of security

Figure 9—Security Controls Overall Risk Scores

Identified Control	Relevant Business Risk	Relevant Information Security Risk	Business Risk Score/Impact (1-5)	Information Security Risk Score/Likelihood (1-5)	Overall Risk Score
Endpoint malware protection	IP theft	Endpoint virus/ Trojan infection	3	5	15
DLP	IP theft	Unauthorized access to digital IP	3	3	9
DR plan	Critical IT failure	Unavailability of critical IT services in disaster	4	3	12

projects, but also ensures business alignment and minimizes potential impact.

The essential steps required to ensure that security controls and projects are in alignment with business priorities include:

1. Mapping security controls with business risk scenarios
2. Identifying the information security risk score if the control is not in place
3. Identifying the business risk score for the relevant control
4. Calculating the overall risk score using the formula: Overall risk score = business risk score x information security risk score
5. Prioritizing projects based on the overall risk score

Endnotes

1 Ghaznavi-Zadeh, R.; "Enterprise Security Architecture: A Top-Down Approach," *ISACA® Journal*, vol. 4, 2017, *https://www.isaca.org/Journal/archives/Pages/default.aspx*

2 *Ibid*. See the previous article for more details on this process.

3 ISACA, *COBIT® 5 for Information Security*, USA, 2013, *www.isaca.org/cobit/pages/info-sec.aspx*

4 The Open Group, The Open Group Open FAIR Certification Program, *www.opengroup.org/certifications/openfair*