

Curriculum for
CPSA Certified Professional for
Software Architecture®
– Advanced Level –

**Module:
EAM**

**Enterprise Architecture
Management**



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Table of Contents

<u>0</u>	<u>INTRODUCTION: GENERAL INFORMATION ON THE ISAQB ADVANCED LEVEL</u>	<u>5</u>
0.1	WHAT DOES AN ADVANCED LEVEL MODULE TEACH?	5
0.2	WHAT CAPABILITIES DO GRADUATES OF THE ADVANCED LEVEL (CPSA-A) ACQUIRE?.....	5
0.3	REQUIREMENTS FOR CPSA-A CERTIFICATION	5
<u>1</u>	<u>INTRODUCTION TO THE ENTERPRISE ARCHITECTURE MANAGEMENT MODULE</u>	<u>6</u>
1.1	STRUCTURE OF THE CURRICULUM FOR ENTERPRISE ARCHITECTURE MANAGEMENT, AND RECOMMENDED TIME ALLOCATION	6
1.2	DURATION, DIDACTICS AND OTHER DETAILS.....	6
1.3	PREREQUISITES FOR THE “ENTERPRISE ARCHITECTURE MANAGEMENT” MODULE	6
1.4	STRUCTURING OF THE MODULE UNITS BASED ON LEARNING OBJECTIVES	7
1.5	SUPPLEMENTARY INFORMATION, TERMS AND TRANSLATIONS	7
1.6	CREDIT POINTS FOR THIS TRAINING MODULE	7
<u>2</u>	<u>INTRODUCTION TO THE ISAQB CERTIFICATION PROGRAM</u>	<u>8</u>
2.1	TERMS AND CONCEPTS	8
2.2	LEARNING OBJECTIVES.....	8
<u>3</u>	<u>BASIC TERMS USED IN ENTERPRISE ARCHITECTURE MANAGEMENT</u>	<u>9</u>
3.1	TERMS AND CONCEPTS	9
3.2	LEARNING OBJECTIVES.....	9
3.3	REFERENCES	10
<u>4</u>	<u>PROCEDURES IN E(IT)AM</u>	<u>11</u>
4.1	TERMS AND CONCEPTS.....	11
4.2	LEARNING OBJECTIVES	11
4.3	REFERENCES	12
<u>5</u>	<u>REPOSITORIES AND METAMODELS</u>	<u>13</u>
5.1	TERMS AND CONCEPTS.....	13
5.2	LEARNING OBJECTIVES	13
5.3	REFERENCES	14
<u>6</u>	<u>GOVERNANCE AND CHANGE MANAGEMENT</u>	<u>15</u>
6.1	TERMS AND CONCEPTS.....	15
6.2	LEARNING OBJECTIVES	15
6.3	REFERENCES	16
<u>7</u>	<u>IMPLEMENTATION OF ENTERPRISE ARCHITECTURE MANAGEMENT</u>	<u>17</u>
7.1	TERMS AND CONCEPTS.....	17
7.2	LEARNING OBJECTIVES	17
7.3	REFERENCES	17
<u>8</u>	<u>ENTERPRISE ARCHITECTURE FRAMEWORKS</u>	<u>18</u>

8.1	TERMS AND CONCEPTS.....	18
8.2	LEARNING OBJECTIVES	18
8.3	REFERENCES	19
<u>9</u>	<u>EXAMPLES OF ENTERPRISE ARCHITECTURE MANAGEMENT.....</u>	<u>20</u>
9.1	TERMS AND CONCEPTS.....	20
9.2	LEARNING OBJECTIVES	20
9.3	REFERENCES	20
<u>10</u>	<u>SOURCES AND REFERENCES OF THE ENTERPRISE ARCHITECTURE MANAGEMENT MODULE</u>	<u>21</u>

0 Introduction: General information on the iSAQB Advanced Level

0.1 What does an Advanced Level Module teach?

- The iSAQB Advanced Level offers modular training in three areas of competence with flexible academic approaches. It considers individual leanings and focuses.
- The certification is achieved by writing a term paper. Experts designated by the iSAQB perform the assessment and administer the oral examination.

0.2 What capabilities do graduates of the Advanced Level (CPSA-A) acquire?

CPSA-A graduates are capable of the following:

- Independent and method-based design of medium- to large-scale IT systems.
- Responsibility for technology and content of IT systems of medium to high criticality.
- Development, design and documentation of measures for achieving non-functional requirements. Support of development teams in implementation of these measures.
- Control and implementation of architecture-related communication in medium to large development teams.

0.3 Requirements for CPSA-A certification

- Successful training and certification as a CPSA-F (Certified Professional for Software Architecture, Foundation Level)
- At least three years of full-time career experience in the IT sector, with participation in design and development of at least two different IT systems
 - Exceptions are possible on application (such as participation in open source projects)
- Training and advanced qualification within the framework of iSAQB Advanced Level courses comprising at least 70 credit points from all three different areas of competence (details in section 1.6).
 - Existing certifications can be accredited for these credit points on application. The list of current certificates accredited as credit points is available on the iSAQB website.
 - Other training and advanced qualifications can also be accredited on application to iSAQB if they are relevant for software architecture. This will be decided on an individual basis by the iSAQB Advanced Level working group.
- Successful completion of the CPSA-A certification examination.

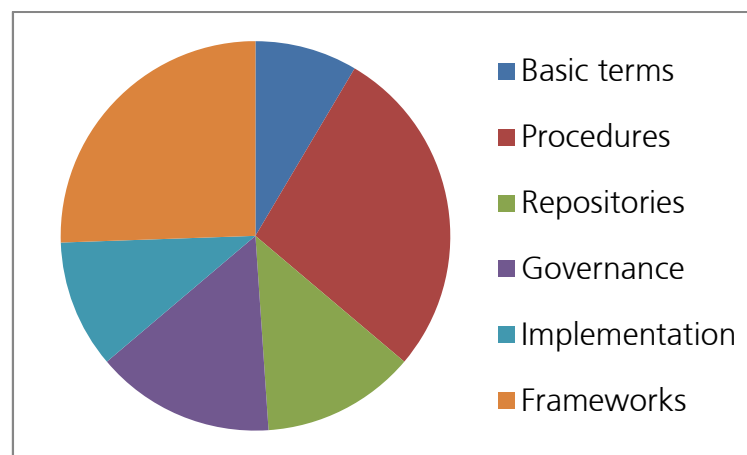


1 Introduction to the Enterprise Architecture Management module

1.1 Structure of the curriculum for Enterprise Architecture Management, and recommended time allocation

- Basic terms used in Enterprise Architecture Management (2 h)
- Procedures in EAM (6.5 h)
- Repositories and meta models (3 h)
- Governance and change management (3.5 h)
- Implementing EAM (2.5 h)
- Enterprise architecture frameworks (6 h)

(All times include exercises.)



1.2 Duration, didactics and other details

The times stated below are recommendations. The minimum duration of a course on web architecture should be 3 days, but it can be longer. Providers can differ with respect to the duration, methodology, type and structure of the exercises as well as the detailed course outline. In particular, the curriculum leaves the type of examples and exercises completely open

The module can be attended independent of a CPSA-F certification.

1.3 Prerequisites for the “Enterprise Architecture Management” module

Participants **should** have the following knowledge and/or experience:

- Fundamentals of architecture development: Importance and delimitation of architecture, procedures, influences and requirements, architecture decisions, models and documentation with views, as taught at the CPSA-F Foundation Level.
- Fundamentals of business management: Development of strategies and business models, business process management, organisation.

- Desirable for an understanding of some concepts: Practical experience in the architecture field and an insight into at least one modern technology or platform for development of distributed applications.

In addition, the following knowledge is **advantageous** for an understanding of some of the concepts covered:

- Knowledge of typical challenges in the field of enterprise architectures:
 - Definition of (IT) enterprise objectives
 - Strategic (IT) planning
 - (IT) portfolio management.
- Additional business management knowledge:
 - Controlling
 - Cost-benefit analysis
 - Investment analysis.

1.4 Structuring of the module units based on learning objectives

The individual units of the curriculum are specified using the following structure:

- **Terms/concepts:** The key terms associated with a topic.
- **Lesson / practical exercise duration:** Defines the minimum time that must be allocated to the teaching and practical exercises for this topic in an accredited course.
- **Learning objectives:** Describe the content to be taught, including the associated key terms and concepts.

This section therefore also outlines the skills to be acquired in corresponding courses. The learning goals are differentiated in the following categories and sections:

- What should participants **be able to** do? Participants should be able to use this content independently after the course. This content is covered during the course by exercises and is part of the architecture documentation module examination and/or the final examination of the iSAQB Advanced Level.
- What should participants **understand**? This content can be tested in the architecture documentation module examination.
- What should participants **know**? This content (terms, concepts, methods, practices, etc.) can support understanding or motivate the subject. This content is not part of the examinations and will be mentioned in courses, but not necessarily taught in detail.
- **References:** References to secondary literature, standards or other sources. A detailed list of books and other sources is available on the iSAQB website under "Specialized sources".

1.5 Supplementary information, terms and translations

If necessary for understanding of the curriculum, we have included technical terms in the iSAQB glossary, with definitions and, as needed, translations of the original literature.

1.6 Credit points for this training module

Courses licenced by the iSAQB e. V. based on this curriculum result in 30 credit points in methodical competence.

2 Introduction to the iSAQB certification program

Duration: 15 min (optional)	Practice time: none
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This section is not relevant for the examination. This section can be omitted if participants are already CPSA-F certified.

2.1 Terms and Concepts

iSAQB, Advanced Level certification and prerequisites for the same.

2.2 Learning Objectives

Participants become familiar with the iSAQB certification program and the corresponding examinations and examination procedures.

2.2.1 What should participants know?

- iSAQB as an association
- Advanced Level as opposed to other levels
- Constraints and procedures of the iSAQB certification program

3 Basic terms used in Enterprise Architecture Management

Duration: 90 minutes	Practical exercises: 30 minutes
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3.1 Terms and Concepts

Enterprise Architecture Management (EAM), corporate strategy, IT strategy, IT governance, IT security, compliance, IT risk management, change management, business architecture, information architecture, IT architecture, application architecture, migration planning, business process management, capabilities, repository.

3.2 Learning Objectives

3.2.1 What should the participants be able to do?

- List and explain the objectives, positive impacts and tasks of EAM.
- Describe and explain the interaction between EAM and other strategic management tasks (e. g., corporate planning, portfolio management, production management, etc.).
- Explain the difference between EAM and E(IT)AM.
- Describe the interaction between (IT) strategy and EAM.
- Strategic Application Portfolio Management: Current, target and planned IT enterprise architecture.
- Explain and execute a practical evaluation of an application portfolio.
- Define business capabilities and explain their benefits.
- List and explain the tasks and challenges of (IT) governance.
- Explain the differences between the different governance levels (corporate, IT, architecture and SOA).
- List and explain requirements for EAM tools.

3.2.2 What should participants understand?

- The role of EAM in a company's planning system
- The importance, challenges and possible positive impact of strategic IT planning
- The role of IT strategy within corporate strategy
- The function of application portfolio management
- The differences between the current, target and planned IT enterprise architectures.
- Contact points between EAM and economic management
- Configuration and interaction of the current, target and planned IT enterprise architectures
- The functions of and differences between the business, application, data and technology architectures
- The functions of IT risk management, compliance and IT security
- The relationship between change management and EAM
- The use of a repository for management and standardisation of the company's IT
- The differences between different enterprise architecture frameworks (e. g., TOGAF, COBIT, ITIL, TM Forum Framework, etc.).

3.2.3 What should the participants know?

- The effort required for and benefits gained from EAM
- The importance of the process map for the enterprise architecture

- Typical EAM visualisations, e. g., layout plan, portfolio diagram, information flow diagram, cluster diagram or master plan diagram.
- Key EAM data and other sources for the strategic planning of the IT landscape, e. g., IT performance, costs, competitive differentiation, etc.

3.3 References

[COBIT]

[Gharbi2012]

[Hanschke2010]

[Hanschke2012]

[ITIL]

[Keller2012]

[Reussner2008]

[Tiemeyer2011]

[TOGAF]

[Vogel2005]

4 Procedures in E(IT)AM

Duration: 270 minutes	Practical exercises: 120 minutes
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4.1 Terms and concepts

Mission, vision, architecture vision, corporate principles, architecture principles, business model, business architecture, regulatory framework for the IT strategy, application portfolio management, information system architecture, data architecture, technical architecture, business process modelling, Business Motivation Model (BMM), TOGAF Architecture Development Method (ADM), SWOT analysis, maturity analysis, benefit analysis, GAP analysis, impact analysis, risk analysis, capability analysis, capability-based planning, scenario-based evaluation.

4.2 Learning objectives

4.2.1 What should the participants be able to do?

- Describe and explain the procedure for formulation of an architecture vision.
- Describe and explain the procedure for architecture planning.
- State and explain the differences between different development models.
- Describe and explain the analysis of the current architecture.
- Describe and explain the development of the target architecture.
- Describe and explain the derivation of the planned architecture from the current and target architectures.
- Describe and explain the derivation of the enterprise architecture from the corporate strategy.
- Describe and explain the observance of corporate principles in the enterprise architecture.
- Describe and explain the importance of the enterprise architecture as a regulatory framework for the IT strategies.
- Describe the importance of the enterprise architecture as the basis for the capability-based planning
- Specify and document the requirements on and conditions & constraints for the enterprise architecture (business scenarios).
- Describe and explain governance and reviewing of implementation projects.
- Describe and explain the function and benefits of change management.

4.2.2 What should the participants understand?

- Architecture principles as component elements of the enterprise architecture
- Categorisation of architecture principles
- Detailing of architecture principles with the aid of a template
- Different sub-architectures
 - Business architecture (incl. its key elements)
 - Information system architecture (incl. its key elements)
 - Data architecture (incl. its key elements)
 - Technical architecture (incl. its key elements).
- Delimitation of the various sub-architectures
- Different forms of documentation for sub-architectures
- EAM as a link between the strategic corporate planning and the application projects

- Enterprise architecture resources for standardisation between application projects
- Procedures for development and updating of an enterprise architecture (capability analysis, business process modelling, etc.).

4.2.3 What should the participants know?

- Different methods and procedure models for the development and updating of an enterprise architecture
- The Business Motivation Model (BMM) and the corresponding docking points
- The Microsoft Services Business Architecture (MSBA)
- The TOGAF architecture framework
- Different instruments and methods for evaluation of existing architectures (e.g. SWOT analysis, maturity analysis, benefit analysis, GAP analysis, impact analysis, risk analysis, scenario-based evaluation)
- Different tools for development and management of an enterprise architecture.

4.3 References

[Gharbi2012]

[Hanschke2012]

[Reussner2008]

[Tiemeyer2011]

[TOGAF]

[Weill2004]

5 Repositories and metamodels

Duration: 120 minutes	Practical exercises: 60 minutes
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5.1 Terms and concepts

Repository, metamodel, current architecture, planned architecture and target architecture, industry standards, reference library, reference architecture, rule, template, model.

5.2 Learning objectives

5.2.1 What should the participants be able to do?

- Describe and explain the function and benefits of EAM repositories.
- List and explain the types of information stored in an EAM repository:
 - Architecture metamodel
 - Documentation of current, future and target architectures
 - Standards (industry standards etc.)
 - Reference library (reference architecture(s), rules, templates, models, etc.) using the TOGAF reference models as an example.
- Describe and explain the differences between the different types of information.
- Describe and explain the need for historization of the information.
- Describe and explain how an EAM repository is used and managed.
- Describe and explain how reference architectures are defined and used.
- Describe and explain how reference architectures are created and updated.

5.2.2 What should the participants understand?

- The challenges associated with decentral use and central management of an EAM repository
- Contact points of the development processes and governance processes
- The function and benefits of metamodels
- The function of the EAM repository during reuse of architectures
- Customisation of metamodels for a company
- Technical implementation of an EAM repository with the aid of tools, and how to plan it
- Technical implementation of an EAM repository with the aid of tools.

5.2.3 What should the participants know?

- Examples of metamodels from architecture frameworks (e. g., TOGAF)
- Examples of reference architecture models:
 - The reference model of the Java EE reference architecture
 - The reference model of the SOA reference architecture
 - The .NET reference model as defined in the Application Architecture Guide
 - TOGAF reference models
 - Sector-specific reference models (TM Forum Framework, etc.)
- Practical examples of reference architectures
- Examples of architecture guidelines/directives.

5.3 References

[Hanschke2012]
[Reussner2008]
[Tiemeyer2011]
[TOGAF]

6 Governance and change management

Duration: 150 minutes	Practical exercises: 60 minutes
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6.1 Terms and concepts

Governance, levels of governance (corporate, IT, architecture, SOA), change management, Architecture Board, architecture guidelines/directives, best practices, key indicators, criteria, conformance, compliance, TOGAF, maturity model, COBIT, governance reviews, architecture planning and adaptation, architecture implementation.

6.2 Learning objectives

6.2.1 What should the participants be able to do?

- List and explain the tasks of IT governance.
- List and explain organisational models for IT governance.
- Describe and explain the function, tasks and composition of the Architecture Board.
- Describe and explain the function, tasks and composition of the Governance Board.
- List and explain best practices, architecture guidelines/directives and principles as input requirements for objectives, procedures, solution spaces, etc.
- Explain the differences between best practices, architecture guidelines/directives and principles.
- List and explain the tasks of a governance review using COBIT as an example.
- Describe and explain a model for monitoring and evaluating IT compliance (e. g., irrelevant, consistent, compliant, conformant, fully conformant, non-conformant as defined in TOGAF).
- Describe and explain maturity models for enterprise architecture development.
- List and explain typical levels of maturity for enterprise architecture development.
- Explain what COBIT is.
- Describe and explain the objectives and benefits of COBIT.
- Describe and explain the central governance principles of COBIT.
- Describe and explain the interaction between COBIT and other frameworks (e. g., TOGAF and ITIL).

6.2.2 What should the participants understand?

- Integration of IT governance into corporate governance
- Integration of IT governance into the IT enterprise architecture
- That IT governance interacts with principles at the enterprise and architecture levels
- The interaction between change management and IT governance
- The sequence of an IT governance review
- Further development of IT governance
- The function of change management and IT governance for business IT alignment
- The importance of IT governance for risk management
- The importance of IT governance for iterative further development of the IT landscape.

6.2.3 What should the participants know?

- An example of organisational structure of IT governance
- Examples of challenges and tasks of IT governance

- IT governance best practices (e. g., recommendations for roles, the responsible persons, boards/committees, processes and concepts and their integration)
- Definition of the terms quality and quality management
- Examples of typical key indicators
- An example of an enterprise architecture maturity model:
 - The EAMMF from the GAO
 - The OMB EA Assessment Framework
 - The Gartner EA Maturity Assessment Framework.

6.3 References

[COBIT]

[Hanschke2010]

[Johannsen2010]

[TOGAF]

[Weill2004]

7 Implementation of Enterprise Architecture Management

Duration: 120 minutes	Practical exercises: 30 minutes
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7.1 Terms and concepts

Implementation paths, example scenarios, migration paths.

7.2 Learning objectives

7.2.1 What should the participants be able to do?

- Describe and explain fundamental implementation paths for an EAM system.
- Describe and explain the organisation of introduction and optimisation of an EAM system.
- Describe and explain the challenges and success factors associated with introduction of an EAM system.
- Describe and explain stakeholder analysis for introduction of EAM.
- Communicate the purpose and benefits of introducing EAM.
- Describe and explain migration paths for the introduction of EAM into an existing IT landscape.
- Describe and explain the iterative procedure for the introduction of EAM into an existing IT landscape.
- Describe and explain limitations on the introduction of EAM into an existing IT landscape.

7.2.2 What should the participants understand?

- The phases involved in introduction of EAM
- Selection of the migration steps for the introduction of EAM into an existing IT landscape.

7.2.3 What should the participants know?

- Example scenarios for the introduction of EAM
- Example scenarios for the introduction of EAM into an existing IT landscape
- The target landscape.

7.3 References

[Hanschke2012]
[Keller2012]
[Schmelzer2010]
[Tiemeyer2011]

8 Enterprise architecture frameworks

Duration: 270 minutes	Practical exercises: 90 minutes
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8.1 Terms and concepts

Architecture frameworks (TOGAF, etc.), business sector frameworks (TM Forum Framework, etc.), audit frameworks (COBIT, etc.), operations frameworks (ITIL, etc.), architecture views (IEEE 1471-2000), metamodel, repository, governance, reference architecture, Zachman, TOGAF, ARIS, CIM, SID, DoDAF, MoDAF, tailoring

8.2 Learning objectives

8.2.1 What should the participants be able to do?

- List and explain requirements on and benefits of enterprise architecture frameworks.
- Differentiate between and explain the types of architecture frameworks:
 - Operational frameworks (e. g., TOGAF)
 - Conceptual frameworks (e. g., Zachmann)
 - Business sector frameworks (e. g., TM Forum Framework).
- List and explain application areas, purposes and target groups of the different types of architecture frameworks.
- Explain the differences between the different types of architecture frameworks.
- Explain the significance of reference models and architectures in the different architecture frameworks.

8.2.2 What should the participants understand?

- The essential elements of TOGAF
- The essential elements of the COBIT framework
- The essential elements of the Zachman framework
- The consideration of "classic" IT disciplines such as software architecture, business process modelling and software development in enterprise architecture frameworks
- Challenges in the use of an enterprise architecture framework
- Selection and tailoring of an enterprise architecture framework for a company.

8.2.3 What should the participants know?

- The TOGAF Architecture Development Method (ADM)
- The TOGAF architecture content framework
- The TOGAF architecture capability framework
- TOGAF architecture governance
- Examples for the customisation effort when using a framework for a specific company
- The Zachman framework
- The ARIS approach
- The Common Information Model (CIM)
- The TM Forum Framework
- The Department of Defense Architecture Framework (DoDAF)
- The Ministry of Defence Architectural Framework (MoDAF)

8.3 References

[DoDAF]
[Hanschke2012]
[MODAF]
[Tiemeyer2011]
[TOGAF]

9 Examples of Enterprise Architecture Management

Duration: minutes	Practical exercises: minutes
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This section is not relevant for the examination.

9.1 Terms and concepts

Within each accredited training course, at least one example of an enterprise architecture must be addressed.

The nature and characteristics of the addressed examples presented can vary depending on the training and/or the interests of the participants, and are not specified by the iSAQB.

9.2 Learning objectives

Discussion of the development of a real enterprise architecture, and its advantages and disadvantages.

9.2.1 What should the participants be able to do?

Not applicable.

9.2.2 What should the participants understand?

Not applicable.

9.2.3 What should the participants know?

Not applicable.

9.3 References

None. Training providers are responsible for the selection and description of examples.

10 Sources and references of the Enterprise Architecture Management module

This section contains references that are referred to in whole or in part in the curriculum.

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[COBIT]

Information Systems Audit and Control Association (ISACA), Online: <http://www.isaca.org/COBIT/Pages/default.aspx>

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[DoDAF]

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[TOGAF]

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