TOGAF SERIES

TOGAF™ 9 Certified Study Guide

Preparation for the TOGAF Part 2 or TOGAF 8-9 Advanced Bridge Section 2 Examinations

Rachel Harrison

Van Haren PUBLISHING

THE Open GROUP
www.opengroup.org

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

TOGAF™ 9 Certified

Study Guide

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

Other publications by Van Haren Publishing

Van Haren Publishing (VHP) specializes in titles on Best Practices, methods and standards within four domains:

- IT management
- Architecture (Enterprise and IT)
- Business management and
- Project management

Van Haren Publishing offers a wide collection of whitepapers, templates, free e-books, trainer material etc. in the **VHP Freezone**: freezone.vanharen.net

VHP is also publisher on behalf of leading organizations and companies:
ASLBiSL Foundation, CA, Centre Henri Tudor, Gaming Works, Getronics, IACCM, IAOP, IPMA-NL, ITSqc, NAF, Ngi, PMI-NL, PON, Quint, The Open Group, The Sox Institute

Topics are (per domain):

IT (Service) Management / IT Governance
ABC of ICT
ASL
BiSL
CATS
CMMI
CoBIT
ISO 17799
ISO 27001
ISO 27002
ISO/IEC 20000
ISPL
IT Service CMM
ITIL® V3
ITSM
MOF
MSF
SABSA

Architecture (Enterprise and IT)
Archimate®
GEA®
SOA
TOGAF™

Business Management
CMMI
Contract Management
EFQM
eSCM
ISA-95
ISO 9000
ISO 9001:2000
OPBOK
Outsourcing
SAP
SixSigma
SOX
SqEME®

Project/Programme/ Risk Management
A4-Projectmanagement
ICB / NCB
MINCE®
M_o_R®
MSP™
P3O
PMBOK® Guide
PRINCE2™

For the latest information on VHP publications, visit our website: www.vanharen.net, or freezone.vanharen.net for free whitepapers, templates and e-books.

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

TOGAF™ 9 Certified

Study Guide

Prepared by Rachel Harrison of Stratton Edge Consulting

THE Open GROUP
www.opengroup.org

Van Haren PUBLISHING

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

Colophon

Title:	TOGAF™ Version 9 Certified Study Guide
Subtitle:	Preparation for the TOGAF 9 Part 2 or TOGAF 8 - 9 Advanced Bridge (section 2) Examinations
Series:	TOGAF Series
A Publication of:	The Open Group
Author:	Prof. Rachel Harrison
Publisher:	Van Haren Publishing, Zaltbommel, www.vanharen.net
ISBN:	978 90 8753 570 4
Edition:	First edition, first impression, January 2010 First edition, second impression, December 2010
Layout and Cover design:	CO2 Premedia, Amersfoort –NL
Print:	Wilco, Amersfoort – NL

Copyright © 2009, The Open Group

No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior permission of the copyright owner.

The views expressed in this Study Guide are not necessarily those of any particular member of The Open Group.

In the event of any discrepancy between text in this Study Guide and the official TOGAF 9 documentation, the TOGAF 9 documentation remains the authoritative version for certification, testing by examination, and Other purposes. The official TOGAF 9 documentation can be obtained online at www.opengroup.org/togaf.

Comments relating to the material contained in this document may be submitted to:

The Open Group
Thames Tower
37-45 Station Road
Reading
Berkshire, RG1 1LX
United Kingdom

or by electronic mail to: ogspecs@opengroup.org

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

Contents

Preface XV
About the Author XXI
Trademarks XXII
Acknowledgements XXIII
References XXIV

Chapter 1 Introduction 1
1.1 Key Learning Points 1
1.2 The TOGAF Certification for People Program 1
1.3 Summary 7
1.4 Recommended Reading 8

PART 1 TOGAF 9 ARCHITECTURE DEVELOPMENT METHOD (ADM)

Chapter 2 Preliminary Phase 11
2.1 Key Learning Points 11
2.2 Objectives 12
2.3 Inputs 13
2.4 Steps 14
2.5 Outputs 23
2.6 Summary 26
2.7 Exercises 27
2.8 Recommended Reading 27

Chapter 3 Phase A: Architecture Vision 29
3.1 Key Learning Points 29
3.2 Objectives 30
3.3 Inputs 31
3.4 Steps 31
3.5 Outputs 43
3.6 Summary 47
3.7 Exercises 48
3.8 Recommended Reading 50

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

Chapter 4 Phase B: Business Architecture 51
4.1 Key Learning Points 51
4.2 Objectives 52
4.3 Inputs 52
4.4 Steps 54
4.5 Outputs 60
4.6 Summary 64
4.7 Exercises 64
4.8 Recommended Reading 65

Chapter 5 Phase C: Information Systems Architectures 67
5.1 Key Learning Points 67
5.2 Objectives 68
5.3 Considerations for the Implementation Order 68
5.4 Inputs 69
5.5 Steps 69
5.6 Outputs 69
5.7 Summary 69
5.8 Exercises 69
5.9 Recommended Reading 69

Chapter 6 Phase C: Data Architecture 71
6.1 Key Learning Points 71
6.2 Objectives 71
6.2 Inputs 72
6.4 Steps 73
6.5 Outputs 78
6.6 Summary 79
6.7 Exercises 79
6.8 Recommended Reading 79

Chapter 7 Phase C: Application Architecture 81
7.1 Key Learning Points 81
7.2 Objectives 81
7.3 Inputs 82
7.4 Steps 83
7.5 Outputs 87
7.6 Summary 88

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

7.7 Exercises 89
7.8 Recommended Reading 89

Chapter 8 Phase D: Technology Architecture 91
8.1 Key Learning Points 91
8.2 Objectives 92
8.3 Inputs 92
8.4 Steps 93
8.5 Outputs 99
8.6 Summary 101
8.7 Exercises 101
8.8 Recommended Reading 101

Chapter 9 Phase E: Opportunities & Solutions 103
9.1 Key Learning Points 103
9.2 Objectives 104
9.3 Inputs 105
9.4 Steps 105
9.5 Outputs 113
9.6 Summary 114
9.7 Exercises 114
9.8 Recommended Reading 114

Chapter 10 Phase F: Migration Planning 115
10.1 Key Learning Points 115
10.2 Objectives 116
10.3 Inputs 117
10.4 Steps 117
10.5 Outputs 125
10.6 Summary 128
10.7 Exercises 128
10.8 Recommended Reading 128

Chapter 11 Phase G: Implementation Governance 129
11.1 Key Learning Points 129
11.2 Objectives 130
11.3 Inputs 131
11.4 Steps 131

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

11.5 Outputs 135
11.6 Summary 138
11.7 Exercises 138
11.8 Recommended Reading 138

Chapter 12 Phase H: Architecture Change Management 139
12.1 Key Learning Points 139
12.2 Objectives 140
12.3 Inputs 140
12.4 Steps 142
12.5 Outputs 143
12.6 Summary 144
12.7 Exercises 144
12.8 Recommended Reading 145

Chapter 13 ADM Architecture Requirements Management 147
13.1 Key Learning Points 147
13.2 Objectives 148
13.3 Inputs 148
13.4 Steps 148
13.5 Outputs 151
13.6 Requirements Impact Assessment 151
13.7 Summary 151
13.8 Exercises 152
13.9 Recommended Reading 152

PART 2 GUIDELINES FOR ADAPTING THE ADM

Chapter 14 Iteration and Levels 155
14.1 Key Learning Points 155
14.2 The Concept of Iteration 155
14.3 Factors Influencing the Use of Iteration 156
14.4 Iteration Cycles 156
14.5 Mapping TOGAF Phases to Iteration Cycles 159
14.6 Applying the ADM at Different Enterprise Levels 161
14.7 Classes of Architecture Engagement 162
14.8 Combining Levels and Iteration 167
14.9 Summary 170

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

14.10 Exercises 170
14.11 Recommended Reading 171

Chapter 15 Security 173
15.1 Key Learning Points 173
15.2 Introduction 173
15.3 Adapting the ADM for Security 175
15.4 Security Input/Output Summary 179
15.5 Summary 181
15.6 Exercises 181
15.7 Recommended Reading 181

Chapter 16 SOA 183
16.1 Key Learning Points 183
16.2 SOA as an Architectural Style 183
16.3 SOA and the TOGAF Metamodel 184
16.4 Enterprise Architecture and SOA 185
16.5 Summary 185
16.6 Recommended Reading 185

PART 3 THE ARCHITECTURE CONTENT FRAMEWORK

Chapter 17 Architecture Content Framework 189
17.1 Key Learning Points 189
17.2 Introduction 189
17.3 The Content Framework and the TOGAF ADM 190
17.4 Why do we Need a Metamodel? 190
17.5 Components of the Content Metamodel 191
17.6 Core Metamodel Concepts 193
17.7 Summary 198
17.8 Exercises 199
17.9 Recommended Reading 199

PART 4 THE ENTERPRISE CONTINUUM

Chapter 18 Architecture Partitioning 203
18.1 Key Learning Points 203
18.2 Introduction 203

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

18.3 The Need for Architecture Partitioning 204
18.4 Characteristics of Architectures 204
18.5 Characteristics of Solutions 205
18.6 Tiers of Architecture in the Architecture Landscape 206
18.7 Partitioning Best Practices and Re-Use 206
18.8 Applying Partitioning to the ADM 207
18.9 Summary 211
18.10 Recommended Reading 211

Chapter 19 Architecture Repository 213
19.1 Key Learning Points 213
19.2 Introduction 213
19.3 The Repository in Detail 214
19.4 Relationship to Other Parts of TOGAF 217
19.5 Summary 217
19.6 Recommended Reading 217

PART 5 TOGAF REFERENCE MODELS

Chapter 20 The Technical Reference Model (TRM) 221
20.1 Key Learning Points 221
20.3 The TRM in Detail 223
20.4 Taxonomy of Application Platform Services 226
20.5 Taxonomy of Application Platform Service Qualities 228
20.6 Using the TRM 229
20.7 Summary 230
20.8 Exercises 230
20.9 Recommended Reading 230

Chapter 12 Integrated Information Infrastructure Reference Model (III-RM) 231
21.1 Key Learning Points 231
21.2 Drivers for Boundaryless Information Flow 231
21.3 How the III-RM Fulfills the Solution Space 232
21.4 The High-Level Structure of the III-RM 232
21.5 Components of the III-RM 234
21.6 Summary 237
21.7 Recommended Reading 237

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

PART 6 ARCHITECTURE CAPABILITY

Chapter 22 Architecture Governance 241
22.1 Key Learning Points 241
22.2 Architecture Governance and the ADM 241
22.3 Key Success Factors 242
22.4 Setting up the Architecture Board 243
22.5 Operating an Architecture Board 244
22.6 Summary 247
22.7 Exercises 247
22.8 Recommended Reading 248

Chapter 23 Architecture Maturity Models 249
23.1 Key Learning Points 249
23.2 Capability Maturity Models 249
23.3 Capability Maturity Model Integration (CMMI) 250
23.4 ACMM 251
23.5 Maturity Assessments and the ADM 252
23.6 Summary 253
23.7 Exercises 253
23.8 Recommended Reading 253

Chapter 24 Architecture Skills Framework 255
24.1 Key Learning Points 255
24.2 Purpose 255
24.3 Benefits 256
24.4 EA Roles, Skills Categories, and Proficiency Levels 257
24.5 Summary 259
24.6 Exercises 259
24.7 Recommended Reading 260

PART 7 BRIDGING FROM TOGAF 8 CERTIFIED TO TOGAF 9 CERTIFIED

Differences between TOGAF 8 and TOGAF 9 263
25.1 Key Learning Points 263
25.2 New Features and Benefits of TOGAF 9 263
25.3 Key Differences between TOGAF 8.1.1 and TOGAF 9 265
25.4 Approaches for Migration 274

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

25.5 Exercises 274
25.6 Recommended Reading 274

Appendix A Test Yourself Examination Paper – Section 1 275
A.1 Introduction 275
A.2 Instructions 275
A.3 Examination – Section 1 275

Appendix B Test Yourself Examination Paper – Section 2 283
B.1 Introduction 283
B.2 Instructions 283
B.3 Questions 283

Appendix C Test Yourself Examination Answers – Section 1 301

Appendix D Test Yourself Examination Answers – Section 2 305
D.1 Question 1 305
D.2 Question 2 306
D.3 Question 3 307
D.4 Question 4 308
D.5 Question 5 309
D.6 Question 6 310
D.7 Question 7 311
D.8 Question 8 312

Appendix E TOGAF 9 Certified Syllabus 313
E.1 Preliminary Phase 313
E.2 Architecture Governance (Level 2) 314
E.3 Business Scenarios Technique 314
E.4 Phase A: Architecture Vision 315
E.5 Architecture Content Framework 315
E.6 Stakeholder Management 316
E.7 TOGAF Content Metamodel 316
E.8 Architecture Implementation Support Techniques 317
E.9 Phase B: Business Architecture 318

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

E.10 Phase C: Information Systems Architectures – Data Architecture 319
E.11 Phase C: Information Systems Architectures – Application Architecture 320
E.12 TOGAF Foundation Architecture: Technical Reference Model (Level 2) 321
E.13 Integrated Information Infrastructure Reference Model (Level 2) 322
E.14 Phase D: Technology Architecture 323
E.15 Migration Planning Techniques 324
E.16 Phase E: Opportunities & Solutions 324
E.17 Phase F: Migration Planning 325
E.18 Phase G: Implementation Governance 325
E.19 Phase H: Architecture Change Management 326
E.20 ADM Architecture Requirements Management 326
E.21 Architecture Partitioning 327
E.22 Architecture Repository 327
E.23 Guidelines for Adapting the ADM: Iteration and Levels 328
E.24 Guidelines for Adapting the ADM: Security 328
E.25 Guidelines for Adapting the ADM: SOA 329
E.26 Architecture Maturity Models 329
E.27 Architecture Skills Framework 330
E.28 Syllabus for Bridging from TOGAF 8 Certified to Level 2 330

Index 331

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

Preface

This Document

This document is a Study Guide for TOGAF™ 9 Certified.

It gives an overview of every learning objective for the TOGAF 9 Certified Syllabus beyond the Foundation level, and is specifically designed to help individuals prepare for certification.

The audience for this Study Guide is:

- Individuals who require a deeper understanding of TOGAF 9
- Professionals who are working in an organization where TOGAF 9 has been adopted and who need to participate in architecture projects and initiatives
- Architects who will be responsible for developing architecture artifacts
- Architects who wish to introduce TOGAF 9 into an architecture practice
- Architects who want to achieve a recognized qualification to demonstrate their detailed knowledge of TOGAF 9
- Architects who have achieved certification to TOGAF 8 Certified and who wish to upgrade their certification

This Study Guide assumes a prior knowledge equivalent to TOGAF 9 Foundation.

While reading this Study Guide, the reader should also refer to the TOGAF Version 9 documentation[1] available online at www.opengroup.org/architecture/togaf9-doc/arch and also available as TOGAF Version 9 "The Book".

The Study Guide is structured as follows:

- Chapter 1 (Introduction) provides a brief introduction to TOGAF certification and the TOGAF 9 examinations that lead to TOGAF 9 Certified, as well as how to use this Study Guide.
- Part 1: TOGAF 9 Architecture Development Method (ADM) comprises

1 TOGAF Version 9 (ISBN: 978-90-8753-230-7, G091), available at www.opengroup.org/bookstore/catalog/g091.htm.

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

Chapters 2 through 13 and consists of a tour of the ADM phases:

— Chapter 2 describes the Preliminary Phase within the ADM. This chapter covers the preparation and initiation activities required to meet the business directive for a new enterprise architecture.
— Chapter 3 describes Phase A: Architecture Vision. This chapter covers the initial phase of an Architecture Development Cycle. It includes information about defining the scope, identifying the stakeholders, creating the Architecture Vision, and obtaining approvals.
— Chapter 4 describes Phase B: Business Architecture. This chapter covers the development of a Business Architecture to support an agreed Architecture Vision.
— Chapter 5 provides an introduction to Phase C: Information Systems Architectures. The next two chapters describe the details of the two parts of Phase C.
— Chapter 6 describes the development of the Data Architecture within Phase C.
— Chapter 7 describes the development of the Application Architecture within Phase C.
— Chapter 8 describes Phase D: Technology Architecture. The Technology Architecture is used as the basis of the following implementation work.
— Chapter 9 describes Phase E: Opportunities and Solutions. This phase conducts initial implementation planning and the identification of delivery vehicles for the architecture defined in the previous phases.
— Chapter 10 describes Phase F: Migration Planning. This phase finalizes a detailed sequence of Transition Architectures with a supporting Implementation and Migration Plan.
— Chapter 11 describes Phase G: Implementation Governance. This phase ensures that the implementation project conforms to the architecture.
— Chapter 12 describes Phase H: Architecture Change Management. This phase ensures that the architecture can respond to the needs of the enterprise as changes arise.
— Chapter 13 describes ADM Architecture Requirements Management, a process that applies throughout the ADM.

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

- Part 2: Guidelines for Adapting the ADM consists of three chapters:
  - Chapter 14 describes how to apply iteration to the ADM, and how to apply the ADM at different enterprise levels.
  - Chapter 15 describes security considerations during the application of the ADM.
  - Chapter 16 describes SOA as an architectural style.
- Part 3: The Architecture Content Framework consists of a single chapter:
  - Chapter 17 describes the Architecture Content Framework and the TOGAF Content Metamodel.
- Part 4: The Enterprise Continuum consists of two chapters:
  - Chapter 18 describes Architecture Partitioning.
  - Chapter 19 describes the Architecture Repository, which is a model for a physical instance of the Enterprise Continuum.
- Part 5: TOGAF Reference Models consists of two chapters:
  - Chapter 20 describes the Technical Reference Model (TRM).
  - Chapter 21 describes the Integrated Information Infrastructure Reference Model (III-RM).
- Part 6: Architecture Capability consists of three chapters:
  - Chapter 22 describes the relationship between Architecture Governance and the ADM. It also describes how to establish and operate an Architecture Board.
  - Chapter 23 describes Architecture Maturity Models.
  - Chapter 24 describes the Architecture Skills Framework.
- Part 7: Bridging from TOGAF 8 Certified to TOGAF 9 Certified consists of a single chapter:
  - Chapter 25 describes the differences between TOGAF 8 and TOGAF 9. This chapter is primarily for individuals who have achieved the TOGAF 8 Certified qualification, and who intend taking the TOGAF 8 – 9 Advanced Bridge Examination.
- Appendix A provides a Practice Test for Section 1 of the TOGAF 8 – 9 Advanced Bridge Examination.
- Appendix B provides a Practice Test for TOGAF 9 Part 2/Section 2 of the TOGAF 8 – 9 Advanced Bridge Examination.
- Appendix C provides the answers to the examination in Appendix A.
- Appendix D provides the answers to the examination in Appendix B.
- Appendix E provides the TOGAF 9 Certified Syllabus.

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

How to Use this Study Guide

The chapters in this Study Guide should be read in order. However, you may wish to use this Study Guide to study topics with which you are already familiar, and it is certainly possible to select topics for review in any order. Where a topic requires further information from a later part in the syllabus, a cross-reference is provided.

Within each chapter are "Key Learning Points" and "Summary" sections that help you to easily identify what you need to know for each topic. Where applicable, a chapter has an "Exercises" section that will help you reinforce key learning points in the chapter.

Each chapter also has a "Recommended Reading" section that indicates relevant, additional sections of the TOGAF 9 document and other sources that should be read to obtain a full understanding of the subject material.

Finally, at the end of this Study Guide are two "Test Yourself" examination papers that can be used to test your readiness to take the official TOGAF examination. Two papers are provided so that this guide covers both the TOGAF 9 Part 2 Examination as well as the TOGAF 8 – 9 Advanced Bridge Examination.

Conventions Used in this Study Guide

The following conventions are used throughout this Study Guide in order to help identify important information and avoid confusion over the intended meaning.

- Ellipsis (…)
  Indicates a continuation; such as an incomplete list of example items, or a continuation from preceding text.
- **Bold**
  Used to highlight specific terms.
- *Italics*
  Used for emphasis. May also refer to other external documents.
- *(Syllabus Reference Unit X, Learning Outcome Y: Statement)*
  Used at the start of a text block to identify the associated TOGAF 9 Certified Syllabus learning outcome.

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

In addition to typographical conventions, the following conventions are used to highlight segments of text:

A Note box is used to highlight useful or interesting information.

A Tip box is used to provide key information that can save you time or that may not be entirely obvious.

About TOGAF

TOGAF is an architecture framework – The Open Group Architecture Framework. TOGAF is a tool for assisting in the acceptance, production, use, and maintenance of enterprise architectures. It is based on an iterative process model supported by best practices and a re-usable set of existing architectural assets.

TOGAF is developed and maintained by The Open Group Architecture Forum. The first version of TOGAF, developed in 1995, was based on the US Department of Defense Technical Architecture Framework for Information Management (TAFIM). Starting from this sound foundation, The Open Group Architecture Forum has developed successive versions of TOGAF at regular intervals and published each one on The Open Group public web site.

This document covers TOGAF Version 9, referred to as "TOGAF 9" within the text of this document. TOGAF 9 was first published in January 2009. TOGAF 9 can be used for developing a broad range of different enterprise architectures. TOGAF complements, and can be used in conjunction with, other frameworks that are more focused on specific deliverables for particular vertical sectors such as Government, Telecommunications, Manufacturing, Defense, and Finance.

About The Open Group

The Open Group is a vendor-neutral and technology-neutral consortium, whose vision of Boundaryless Information Flow™ will enable access to

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

integrated information within and between enterprises based on open standards and global interoperability. The Open Group works with customers, suppliers, consortia, and other standards bodies. Its role is to capture, understand, and address current and emerging requirements, establish policies, and share best practices; to facilitate interoperability, develop consensus, and evolve and integrate specifications and Open Source technologies; to offer a comprehensive set of services to enhance the operational efficiency of consortia; and to operate the industry's premier certification service.

Further information on The Open Group is available at www.opengroup.org.

The Open Group has over 15 years experience in developing and operating certification programs and has extensive experience developing and facilitating industry adoption of test suites used to validate conformance to an open standard or specification.

The Open Group publishes a wide range of technical documentation, the main part of which is focused on development of Technical and Product Standards and Guides, but which also includes White Papers, Technical Studies, and Business Titles.

A catalog is available at www.opengroup.org/bookstore.

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

About the Author

Rachel Harrison is Managing Director of Stratton Edge Consulting and a Visiting Professor of Computer Science at the University of Reading. Previously, she was Professor of Computer Science at the University of Reading, Head of the Department of Computer Science, Director of Research for the School of Systems Engineering, and Co-Founder and Director of the Reading e-Science Centre and of the Informatics Research Centre. She is Editor-in-Chief of the Software Quality Journal, which is published by Springer. Her research interests include software metrics, requirements engineering, systems evolution, and software testing. She has published over 80 refereed papers and consulted widely with industry, working with organizations such as IBM, the DRA, Philips Research Labs, Praxis Critical Systems, and The Open Group.

Prof. Harrison holds an MA in Mathematics from Oxford University, an MSc in Computer Science from University College London, and a PhD in Computer Science from the University of Southampton. She is a Member of the British Computer Society, an Affiliate Member of the IEEE-CS, a Member of the Association of Computing Machinery, and is a Chartered Engineer.

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

Trademarks

Boundaryless Information Flow™ and TOGAF™ are trademarks and ArchiMate®, Making Standards Work®, The Open Group®, and UNIX® are registered trademarks of The Open Group in the United States and other countries.

BPMN™ and Business Process Modeling Notation™ are trademarks of the Object Management Group (OMG).

All other brand, company, and product names are used for identification purposes only and may be trademarks that are the sole property of their respective owners.

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

Acknowledgements

The Open Group gratefully acknowledges The Open Group Architecture Forum for developing The Open Group Architecture Framework (TOGAF).

The Open Group gratefully acknowledges the following reviewers who participated in the review of this Study Guide:

- Beryl Bellman
- Geoff Burke
- Jörgen Dahlberg
- Steve Else
- Bill Estrem
- Howard Gottlieb
- Joop Hoefnagels
- Paul Homan
- Andrew Josey
- Graham Neal
- Marleen Olde Hartman
- Simon Parker
- Mona Pomraning
- Felix Rausch
- Brian Selves

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

References

The following documents are referenced in this Study Guide:

- TOGAF Version 9, available online at www.opengroup.org/architecture/togaf9-doc/arch, and also available as TOGAF Version 9 "The Book" (ISBN: 9-789087-532307, G091) at www.opengroup.org/bookstore/catalog/g091.htm.
- TOGAF 9 Foundation Study Guide (ISBN: 978-90-8753-231-4, B094) available at www.opengroup.org/bookstore/catalog/b094.htm.
- The Open Group Architecture Principles, Case Study by Darren Hawley on behalf of The Open Group Internal Architecture Board, October 2008 (Y082), published by The Open Group (www.opengroup.org/bookstorre/catalog/y082.htm).
- SOA Source Book, April 2009 (G093), published by The Open Group (www.opengroup.org/bookstore/catalog/g093.htm).
- ISO/IEC 42010:2007, Systems and Software Engineering – Recommended Practice for Architectural Description of Software-Intensive Systems, Edition 1 (technically identical to ANSI/IEEE Std 1471-2000).
- TOGAF Certification for People: Program Summary Datasheet, February 2009, published by The Open Group (www.opengroup.org/togaf9/cert/docs/togaf9_cert_summary.pdf).
- TOGAF 9 Certified Datasheet, February 2009, published by The Open Group (www.opengroup.org/togaf9/cert/docs/togaf9_foundation.pdf).
- TOGAF 9 Certified Datasheet, February 2009, published by The Open Group (www.opengroup.org/togaf9/cert/docs/togaf9_cert.pdf)
- TOGAF Certification for People: Certification Policy, February 2009 (X091), published by The Open Group (www.opengroup.org/bookstore/catalog/x091.htm).
- TOGAF Certification for People: Conformance Requirements (Multi-level), February 2009 (X092), published by The Open Group (www.opengroup.org/bookstore/catalog/x092.htm).
- Zachman Framework, Zachman Institute for Framework Advancement (ZIFA) (www.zifa.com).
- Bill Estrem, "TOGAF to the Rescue" (www.opengroup.org/downloads)
- Enterprise Architecture Planning (EAP): Developing a Blueprint for Data, Applications, and Technology, Steven H. Spewak & Steven C. Hill, ISBN: 0-47-159985-9, John Wiley & Sons, 1993.

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

- US Department of Commerce Enterprise Architecture Capability Maturity Model (ACMM), Version 1.2 (http://ocio.os.doc.gov/ITPolicyandPrograms/Enterprise_Architecture/PROD01_004935).
- ArchiMate 1.0 Specification, Technical Standard, February 2009 (C091), published by The Open Group (www.opengroup.org/bookstore/catalog/c091.htm).
- Mapping of TOGAF 8.1 With COBIT 4.0 by the IT Governance Institute (ITGI), White Paper, July 2007 (W072), published by The Open Group (www.opengroup.org/bookstore/catalog/w072.htm)
- Guide to Security Architecture in TOGAF ADM, White Paper developed by The Open Group Security Forum and Members of The Open Group Architecture Forum, December 2005 (W055), published by The Open Group (www.opengroup.org/bookstore/catalog/w055.htm)

The following web links are referenced in this Study Guide:

- The Open Group TOGAF 9 Certification web site: www.opengroup.org/togaf9/cert
- The TOGAF information web site: www.togaf.info
- TOGAF 9 People Certification Overview presentation: www.togaf.info/sg01
- Introduction to the ADM presentation: www.togaf.info/sg02
- Sample Catalogs, Matrices, and Diagrams presentation: www.togaf.info/sg03
- TOGAF 9 Architecture Content Metamodel Overview presentation: www.togaf.info/sg04

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

Chapter 1

Introduction

1.1 Key Learning Points

This document is a Study Guide for TOGAF Version 9 for students planning to qualify as TOGAF 9 Certified. This document is a companion document to the TOGAF 9 Foundation Study Guide, and focuses on the learning outcomes beyond the Foundation level.

Prerequisite Knowledge

This Study Guide assumes a prior knowledge equivalent to TOGAF 9 Foundation. This can be obtained by reading the TOGAF 9 Foundation Study Guide (see References).

This first chapter will familiarize you with the TOGAF 9 certification program, as well as give you important information about the structure of the TOGAF 9 examinations.

The objectives of this chapter are as follows:

- To provide an understanding of TOGAF certification
- To learn key facts about the TOGAF 9 examinations

1.2 The TOGAF Certification for People Program

Certification is available to individuals who wish to demonstrate they have attained the required knowledge and understanding of TOGAF Version 9.

There are two levels defined for TOGAF 9 "people certification", denoted *TOGAF 9 Foundation* and *TOGAF 9 Certified*, respectively. This Study Guide covers the second of these – TOGAF 9 Certified. Studying for TOGAF 9 Certified includes all the learning outcomes for TOGAF 9 Foundation, which are covered in a separate companion document (see References).

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

1.2.1 Certification Document Structure

The documents available to support the program are as shown in Figure 1:

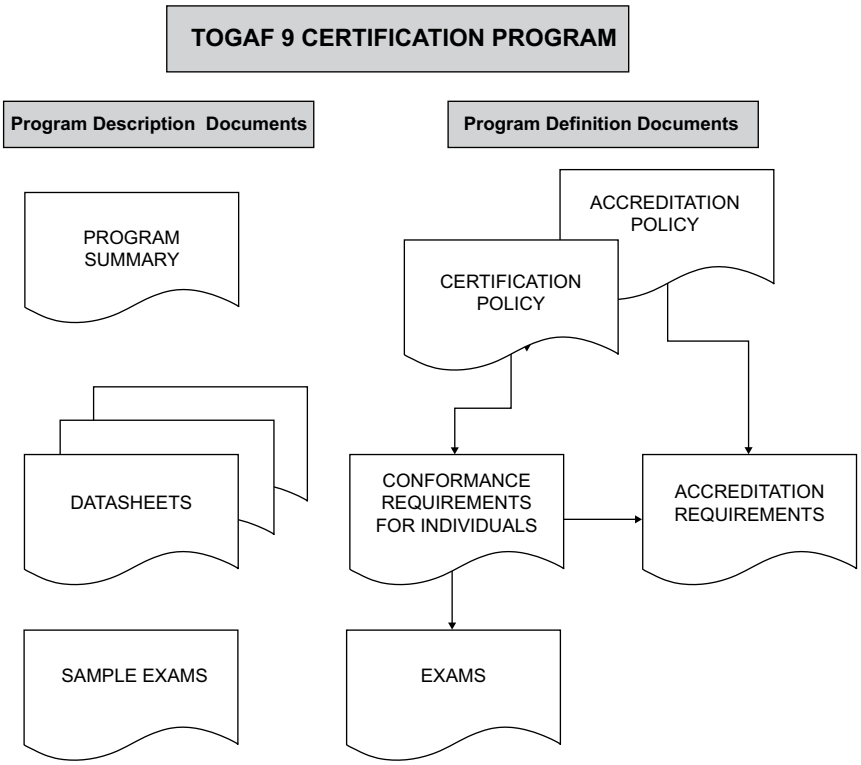

Figure 1: Certification Document Structure

Program description documents, such as this Study Guide, are intended for an end-user audience including those interested in becoming certified. The Program definition documents are intended for trainers, examination developers, and the Certification Authority. All these documents are available from The Open Group web site.[2]

2 Available at the TOGAF 9 certification web site (www.opengroup.org/togaf9/cert), or The Open Group bookstore (www.opengroup.org/bookstore).

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

1.2.2 TOGAF 9 Foundation

The purpose of certification to TOGAF 9 Foundation is to provide validation that the Candidate has gained knowledge of the terminology, structure, and basic concepts of TOGAF 9, and understands the core principles of Enterprise Architecture and TOGAF. The learning objectives at this level focus on knowledge and comprehension. More information is provided in the TOGAF 9 Foundation Study Guide (see References).

1.2.3 TOGAF 9 Certified

The purpose of certification to TOGAF 9 Certified is to provide validation that, in addition to the knowledge and comprehension of TOGAF 9 Foundation, the Candidate is able to analyze and apply this knowledge. The learning objectives at this level therefore focus on application and analysis in addition to knowledge and comprehension.

Individuals certified at this level, in addition to the knowledge required for TOGAF 9 Foundation, will have demonstrated their understanding of:

- How to apply the ADM phases in development of an enterprise architecture
- How to apply Architecture Governance in development of an enterprise architecture
- How to apply the TOGAF Architecture Content Framework
- How to apply the concept of building blocks
- How to apply the Stakeholder Management Technique
- How to apply the TOGAF Content Metamodel
- How to apply TOGAF recommended techniques when developing an enterprise architecture
- The TOGAF Technical Reference Model (TRM) and how to customize it to meet an organization's needs
- The Integrated Information Infrastructure Reference Model (III-RM)
- The content of the key deliverables of the ADM cycle
- How an enterprise architecture can be partitioned to meet the specific needs of an organization
- The purpose of the Architecture Repository
- How to apply iteration and different levels of architecture with the ADM
- How to adapt the ADM for security
- SOA as a style of architecture

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

- The role of architecture maturity models in developing an enterprise architecture
- The purpose of the Architecture Skills Framework and how to apply it within an organization

Self-Study Paths

The self-study paths[3] to achieve certification for TOGAF 9 Certified are summarized in Figure 2. The chosen path depends on existing qualifications, such as whether you are TOGAF 8 Certified, and whether you want to first become certified to TOGAF 9 Foundation or proceed direct to TOGAF 9 Certified.

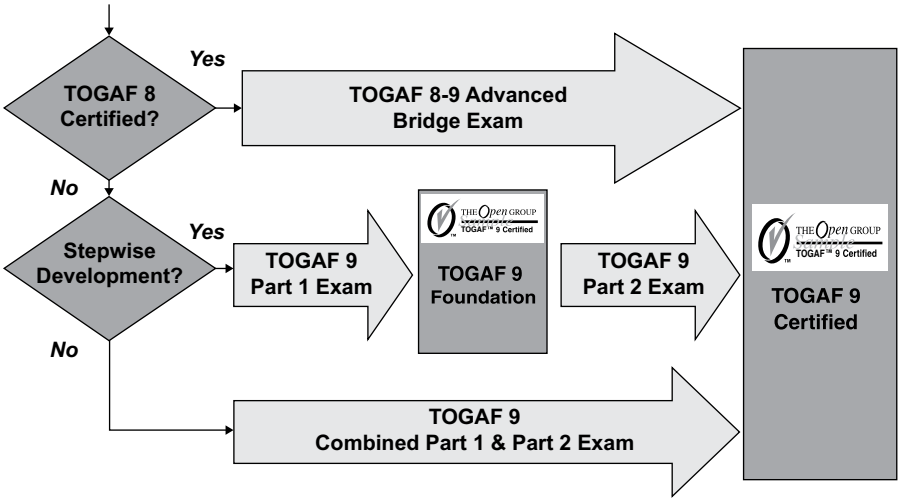

Figure 2: Paths to Achieving TOGAF 9 Certified

3 The latest information on the TOGAF 9 certification program can be obtained from the TOGAF 9 Certification web site at www/opengroup.org/togaf9/cert.

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

What is the Relationship between TOGAF 9 Foundation and TOGAF 9 Certified?
The learning outcomes for TOGAF 9 Certified are a superset of those for TOGAF 9 Foundation. Candidates are able to choose whether they wish to learn in a stepwise manner by becoming certified to TOGAF 9 Foundation and then at a later date TOGAF 9 Certified, or bypass TOGAF 9 Foundation and go directly to TOGAF 9 Certified in one session.
For those going directly to TOGAF 9 Certified there is a choice of taking the two examinations separately or a Combined examination. The advantage of taking the two examinations over the single Combined examination is that if you pass Part 1 but fail Part 2 you can still qualify for TOGAF 9 Foundation.

1.2.4 The Certification Process

The TOGAF 9 Certified Syllabus is contained in Appendix E.

Readers are assumed to be already familiar with the syllabus for TOGAF 9 Foundation and its accompanying TOGAF 9 Part 1 Examination. Detailed information is provided in the TOGAF 9 Foundation Study Guide (see References).

The TOGAF 9 Part 2 Examination
The syllabus for the TOGAF 9 Part 2 Examination consists of all the learning outcomes defined in both Level 1 and Level 2 of the Conformance Requirements document. At the time of writing this document, the examination topics are drawn from the learning outcomes with eight scenario-based questions.

The eight scenarios are drawn from the following major topic areas:

- ADM Phases: Project Establishment (Phases Preliminary, A, Requirements Management)
- ADM Phases: Architecture Definition (Phases B, C, D)
- ADM Phases: Transition Planning (Phases E and F)
- ADM Phases: Governance (Phases G and H)
- Adapting the ADM
- Architecture Content Framework
- TOGAF Reference Models
- Architecture Capability Framework

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

The TOGAF 8 – 9 Advanced Bridge Examination
Candidates who have previously qualified to TOGAF 8 Certified can take a single examination known as the TOGAF 8 – 9 Advanced Bridge Examination.

This contains two sections as follows:

- Section 1: Twenty simple multiple-choice questions drawn from the TOGAF 9 Level 1 Syllabus. This is a subset of the TOGAF 9 Part 1 Examination
- Section 2: Eight scenario-based questions as per the TOGAF 9 Part 2 Examination

1.2.4.1 *Format of the Examination Questions*

The questions for Section 1 of the Advanced Bridge Examination are simple multiple-choice questions as described in the TOGAF 9 Foundation Study Guide. Examples of these questions are provided in Appendix A.

The questions for the TOGAF 9 Part 2 Examination and Section 2 of the Advanced Bridge Examination consist of eight complex scenario questions. Candidates must read a scenario describing a situation where TOGAF is being applied. The question will then ask how TOGAF would be used to address a particular point, and provide four possible answers. The answers are graded. One answer is more correct than two of the others, and one is incorrect for the situation. The aim is to select the best answer according to TOGAF 9. The correct answer scores fve points, the second best answer three points, and the third best answer one point. The incorrect answer (or distracter) scores zero points.

The exact display format is test center-specific and will be made clear on the screens when taking the examination. Examples of these questions are provided in Appendix B.

1.2.4.2 *What do I need to bring with me to take the examination?*

You should consult with the test center regarding the forms of picture ID needed to verify your identification.

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

1.2.4.3 *If I fail, how soon can I retake the examination?*

You are expected to be familiar with the current policy on The Open Group web site. At the time of writing, the policy states that individuals who have failed the examination are not allowed to retake the examination within one month of the first sitting.

1.2.5 Preparing for the Examination

You can prepare for the examination by working through this Study Guide section-by-section. After completing each section you should complete the exercises and read the referenced sections from the TOGAF documentation. Once you have completed all the sections in this Study Guide, you can then attempt the appropriate Test Yourself examination paper(s) in the appendices. This is designed as a thorough test of your knowledge. If you have completed all the prescribed preparation and can attain a pass mark for the Test Yourself examination paper(s), then you may be ready to sit the examination.

Open-Book Examinations

Both the TOGAF 9 Part 2 Examination and the TOGAF 8 – 9 Advanced Bridge Examinations are open-book. The test center will provide access to the TOGAF 9 specification. At Prometric test centers, the TOGAF 9 specification is provided as part of the examination itself.

1.3 Summary

The TOGAF 9 People certification program is a knowledge-based certification program. It has two levels, leading to certification for TOGAF 9 Foundation and TOGAF 9 Certified, respectively.

The topic for this Study Guide is preparation for the TOGAF 9 Part 2 Examination or Section 2 of the TOGAF 8 – 9 Advanced Bridge Examination, leading to TOGAF 9 Certified. The TOGAF 9 Part 2 Examination comprises eight scenario-based questions to be completed in 90 minutes. The Bridge examination also includes twenty multiple-choice questions and has a time limit of two hours.[5]

5 Additional time is allowed for candidates for whom English is a second language where the examination is not available in the local language.

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net

Preparing for the examination includes the following steps:

- You should work through this Study Guide step-by-step.
- At the end of each chapter, you should complete the exercises (where provided) and read the sections of the TOGAF documentation listed under Recommended Reading.
- Once you have completed all the chapters in this Study Guide, you should attempt the applicable Test Yourself examination paper in the appendices.
- If you can attain the target score for the paper, then you have completed your preparation.

1.4 Recommended Reading

The following are recommended sources of further information for this chapter:

- TOGAF Certification for People: Program Summary Datasheet
- TOGAF 9 Certified Datasheet
- TOGAF Certification for People: Certification Policy)
- TOGAF Certification for People: Conformance Requirements (Multi-level)
- The Open Group TOGAF 9 Certification web site: www.opengroup.org/togaf9/cert
- The TOGAF information web site: www.togaf.info
- TOGAF 9 People Certification Overview presentation: www.togaf.info/sg01

Copyright protected. Use is for Single Users only via a VHP Approved License.
For information and printed versions please see www.vanharen.net