THE Open GROUP

Modeling the Insurance Enterprise

Using the TOGAF®, ArchiMate®, and ACORD® Standards together with the ACORD Framework

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Boundaryless Information Flow™
achieved through global interoperability
in a secure, reliable, and timely manner

Executive Summary

Insurance companies can use TOGAF® and the ArchiMate® language to manage their Enterprise Architectures while using the ACORD® framework and standards to standardize their operations, integrate their applications, and streamline partner interaction. The Open Group has therefore been collaborating with the ACORD insurance standards organization to develop methods of using these paradigms together.

TOGAF provides conceptual models for all aspects of EA, including an Architecture Content Framework (ACF) and an Architecture Development Method (ADM). The ArchiMate language is a visual modeling standard that Enterprise Architects can use with the TOGAF ACF or other content frameworks. Since the ArchiMate language is specifically designed for Enterprise Architecture, models expressed in this language orient, integrate, and summarize more detailed design models, such as Unified Modeling Language (UML) models for software and Business Process Modeling Notation (BPMN) models for business processes.

The ACORD framework is a populated architecture content framework spanning insurance information, capabilities, and application components, while the ACORD standards define forms, EDI, and XML messaging for communication within and between insurance industry participants. For insurance software developers and integrators, much of the ACORD framework is already available as UML models, and all relevant standards have XML versions.

This White Paper shows that the ACORD framework and standards complement TOGAF and the ArchiMate language. It is therefore directed at managers, architects, and designers that serve the insurance industry or have an interest in integrating the TOGAF and ArchiMate standards with industry architectures. This White Paper supports The Open Group vision of Boundaryless Information Flow by facilitating the development of capabilities for efficient and accurate information exchange across insurance systems and organizations.

Introduction

The global financial crisis and the recession have shaken the very foundation of the global financial architecture. They raise challenging questions about the economic future given the global economic inter-dependencies, governance gaps, and systemic risks intrinsic to globalization. Many financial leaders are therefore rethinking the purpose and business models of their institutions [1]. This rethinking has already triggered attempts to redesign parts of the financial system. One of them involves more intense and effective international co-ordination of financial policy. A critical success factor for this effort is the availability of business, application, and technology architecture standards. The insurance industry has already established an institute for this purpose: the Association for Cooperative Operations Research and Development (ACORD) [2].

Going forward, successful insurance companies will be defined more by their business strategies than by their responses to the financial crisis. Although historically it seems many enterprises were unable to derive success from their strategy, research has shown that strategic failure is mostly the avoidable result of inadequate strategy implementation – rarely is it the inevitable consequence of a poor strategy [3].

A paradigm shift is required: Successful enterprises must be purposefully designed, engineered, and implemented systems. In order to bring changes in a systematic and controlled way, enterprise leaders need *system ontology*, or knowledge concerning the construction and operation of enterprises. This knowledge results from making the normative aspects of enterprise system design explicit. Enterprise Architecture (EA) does exactly that. The Open Group offers a range of EA standards, including TOGAF [4], and the ArchiMate modeling language[5]. Therefore, insurance organizations that combine standards from The Open Group and ACORD are powerfully equipped to develop and continuously improve successful Enterprise Architectures.

This White Paper shows how offerings from two global consensus standards bodies can be used together for the immediate benefit of insurance industry players. It presents the initial result of a collaboration between The Open Group and ACORD towards a unified EA framework for the insurance industry. The White Paper begins with overviews of the TOGAF and ArchiMate standards, followed by an exploration of the ACORD framework and standards using ArchiMate concepts, relationships, and notation. Then, the paper presents an insurance case study followed by guidance on applying the ACORD framework and standards to architecture development efforts based on the TOGAF standard.

The Open Group activities are all aligned with The Open Group vision of Boundaryless Information Flow™, a shorthand representation of “access to integrated information to support business process improvements”, which represents a desired state of an enterprise’s infrastructure and is specific to the business needs of the organization.

An infrastructure that provides Boundaryless Information Flow™ has open standard components that provide services in a customer's extended enterprise that:

- Combine multiple sources of information
- Securely deliver the information whenever and wherever it is needed, in the right context for the people or systems using that information

This White Paper demonstrates how the TOGAF and ArchiMate standards, along with the ACORD framework and standards, can help organizations plan, develop, and integrate components that enable Boundaryless Information Flow™.

TOGAF

Introduction

TOGAF [4] is an architecture framework. Put simply, TOGAF is a tool for assisting in the acceptance, production, use, and maintenance of architectures. It is based on an iterative process model supported by best practices and a re-usable set of existing architectural assets. In the context of TOGAF, "architecture" has two meanings:

1. A formal description of a system, or a detailed plan of the system at a component level to guide its implementation
2. The structure of components, their inter-relationships, and the principles and guidelines governing their design and evolution over time

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 White Paper references TOGAF Version 9.1, referred to simply as "TOGAF" within the text of this document. TOGAF 9.1 was first published in December 2011, and is a maintenance update to TOGAF 9 that was published in January 2009. This latest version is an evolution from TOGAF 8.1.1 and a description of the changes is provided in Appendix A.

Usage

TOGAF can be used for developing and applying a broad range of different Enterprise Architectures. These architectures can be categorized into four related types:

- *Business Architecture* encompasses an organization's business strategy, governance, and key business processes.
- *Data Architecture* is the structure of an organization's logical and physical data assets and data management resources.
- *Application Architecture* is a blueprint for individual applications to be deployed, their interactions, and their relationships to the core business processes of the organization.
- *Technology Architecture* is the logical software and hardware capabilities that are required to support the deployment of business, data, and application services. This includes IT infrastructure, middleware, networks, communications, processing, and standards.

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. The key to TOGAF is the method – the Architecture Development Method (ADM) – for developing an Enterprise Architecture that addresses business needs.

Structure

The TOGAF 9.1 document (Figure 1) , consists of:

- Part I: Introduction provides a high-level introduction to the key concepts of Enterprise Architecture and, in particular, to the TOGAF approach. It contains the definitions of terms used throughout TOGAF and release notes detailing the changes between this version and the previous version of TOGAF.
- Part II: Architecture Development Method (ADM) (Figure 2) is the core of TOGAF. The ADM is a full-lifecycle approach for creating, applying, and evolving Enterprise Architectures.
- Part III: ADM Guidelines and Techniques provides methods for adapting the ADM to different process styles and specialized architectures, as well as techniques for specific ADM tasks.
- Part IV: Architecture Content Framework (ACF) describes and inter-relates the work products that architects produce as they execute the ADM, including formally specified, delivered, and reviewed deliverables, more granular, viewpoint-specific artifacts, and potentially re-usable building blocks. The TOGAF Content Metamodel (Figure 3) formally defines these work products as well as the concepts they employ to depict Enterprise Architectures.
- Part V: Enterprise Continuum and Tools describes how architects can classify artifacts and structure a repository that supports straightforward management, reference, and re-use. Part V also provides guidance on the evaluation and selection of Enterprise Architecture tools.
- Part VI: Reference Models consists of a Technical Reference Model (TRM), and an Integrated Information Infrastructure Reference Model (III-RM). Both models consist of a taxonomy with descriptive graphics. The TRM models a generic application platform that emphasizes application portability and interoperability. The III-RM expands the TRM Infrastructure Applications and Business Applications components to model the delivery of both integrated information and integrated access to that information.
- Part VII: Architecture Capability Framework discusses the organization, processes, skills, roles, and responsibilities required to establish and operate an architecture practice within an enterprise.
- Appendices A and B respectively cover Supplementary Definitions and Abbreviations.

This overview of TOGAF emphasizes the Architecture Development Method (ADM) and the Architecture Content Framework (ACF). This is in preparation for a later section of this White Paper that explains how the ACORD standards and framework elements can be applied to particular ACF artifacts within several ADM phases.

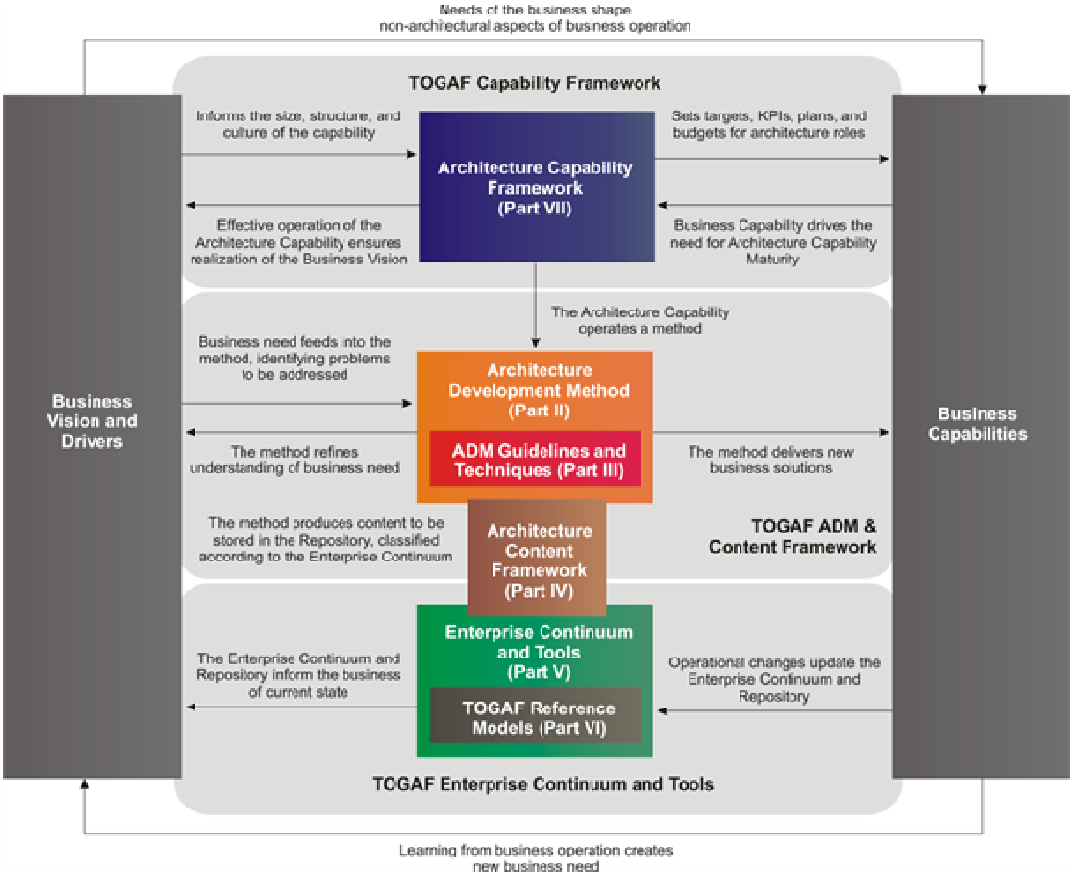

Figure 1: Structure of the TOGAF Document

Architecture Development Method (ADM)

The TOGAF ADM, a result of contributions from many architecture practitioners, forms the core of TOGAF. It is a method for deriving organization-specific Enterprise Architectures and is specifically designed to address business requirements. The ADM describes:

- A reliable, proven way of developing and using an Enterprise Architecture
- A method of developing related business, application, data, and technology architectures that enable the architect to ensure that a complex set of requirements are adequately addressed
- A set of guidelines and techniques for architecture development

The ADM consists of a number of phases that cycle through a range of architecture domains that enable the architect to ensure that a complex set of requirements is adequately addressed. The basic structure of the ADM is shown in Figure 2.

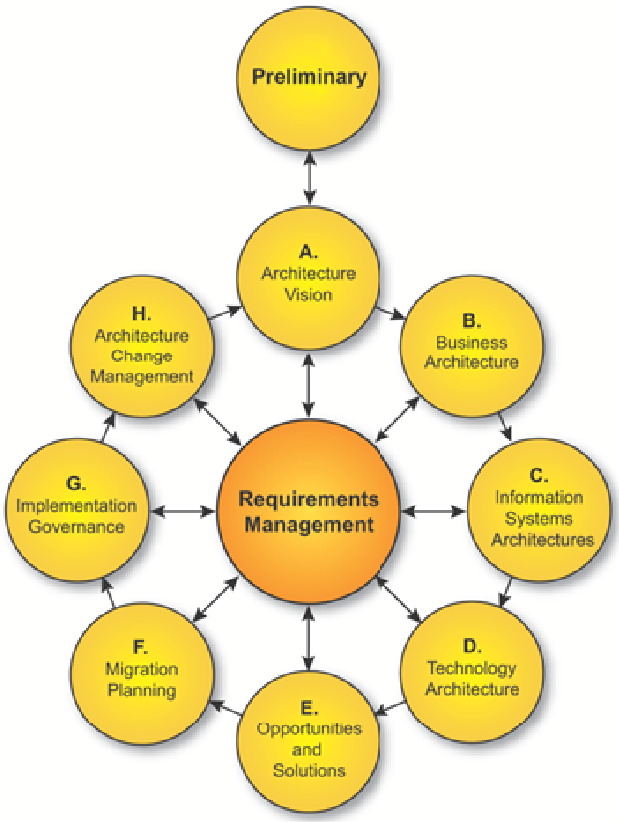

Figure 2: TOGAF Architecture Development Method (ADM) Cycle

The ADM is applied iteratively throughout the entire process of architecture development, between phases, and within them. Throughout the ADM cycle, there should be frequent validation of results against the original requirements, both those for the whole ADM cycle, and those for the particular phase of the process. Such validation should reconsider scope, detail, schedules, and milestones. Each phase should consider assets produced from previous iterations of the process and external assets from the marketplace, such as other frameworks or models.

The ADM supports the concept of iteration at three levels:

- Cycling around the ADM: The ADM is presented in a circular manner indicating that the completion of one phase of architecture work directly feeds into subsequent phases of architecture work.
- Iterating between phases: TOGAF describes the concept of iterating across phases (e.g., returning to Business Architecture on completion of Technology Architecture).
- Cycling around a single phase: TOGAF supports repeated execution of the activities within a single ADM phase as a technique for elaborating architectural content.

Each phase of the ADM involves distinct activities and relationships to other phases. The Preliminary Phase prepares the organization for successful TOGAF projects. It includes the customization of TOGAF, the selection of architecture tools, and the definition of Architecture Principles. The Requirements Management Phase supports every stage of a TOGAF-based project. Project participants identify and store requirements,

and feed them in and out of the relevant ADM phases. In those phases, participants dispose of, address, and prioritize those same requirements.

Phase A: Architecture Vision sets the scope, constraints, and expectations for a TOGAF project. Enterprise Architects create the Architecture Vision, identify stakeholders, validate the business context, create the Statement of Architecture Work, and obtain the approvals necessary to move the project forward.

In the next three phases, Enterprise Architects develop Baseline and Target Architectures, and analyze gaps. The phases are Phase B: Business Architecture, Phase C: Information Systems Architecture (Applications & Data), and Phase D: Technology Architecture. Architectures are organized into building blocks. These phases involve the definition and selection of re-usable architecture components called Architecture Building Blocks (ABBs):

- Define what functionality will be implemented
- Capture business and technical requirements
- Are technology-aware
- Direct and guide the development of Solution Building Blocks (SBBs)

SBBs, on the other hand:

- Define what products and components will implement the functionality
- Define the implementation
- Fulfill business requirements
- Are product or vendor-aware

Beginning with Phase E: Opportunity & Solutions, the focus of the ADM shifts from architecture development to implementation planning. In this phase, Enterprise Architects perform initial implementation planning and the identification of delivery vehicles for the building blocks identified in the previous phases. They determine whether an incremental approach is required, and if so identify Transition Architectures. In Phase F: Migration Planning, Enterprise Architects develop a detailed Implementation and Migration Plan that addresses how to move from the Baseline to the Target Architectures developed in Phases B, C, and D. In Phase G: Implementation Governance, Enterprise Architects apply the work of previous phases to provide architectural oversight for the implementation. They prepare and issue Architecture Contracts, and ensure that implementation activities conform to the architecture. In Phase H: Architecture Change Management, Enterprise Architects provide continual monitoring and a change management process to ensure that the architecture responds to the needs of the enterprise and provides maximal business value.

Architecture Content Framework (ACF)

The TOGAF ACF is a structured metamodel for architectural artifacts. It specifies three categories of architectural work products:

- A deliverable is a formal work product that is contractually specified, and would normally be reviewed, agreed, and signed off by its stakeholders. Deliverables often represent the output of projects.
- An artifact is an architectural work product that describes an aspect of the architecture. Artifacts are generally classified as catalogs (lists of things), matrices (showing relationships between things), and diagrams (pictures of things). Artifacts define both Architecture and Solution Building Blocks at various

levels of abstraction. Example artifacts include a requirements catalog, business interaction matrix, and a use-case diagram. An architectural deliverable may contain many artifacts and artifacts form the content of the Architecture Repository.

- A building block represents a potentially re-usable component of business, IT, or architectural capability that can be combined with other building blocks to deliver architectures and solutions.

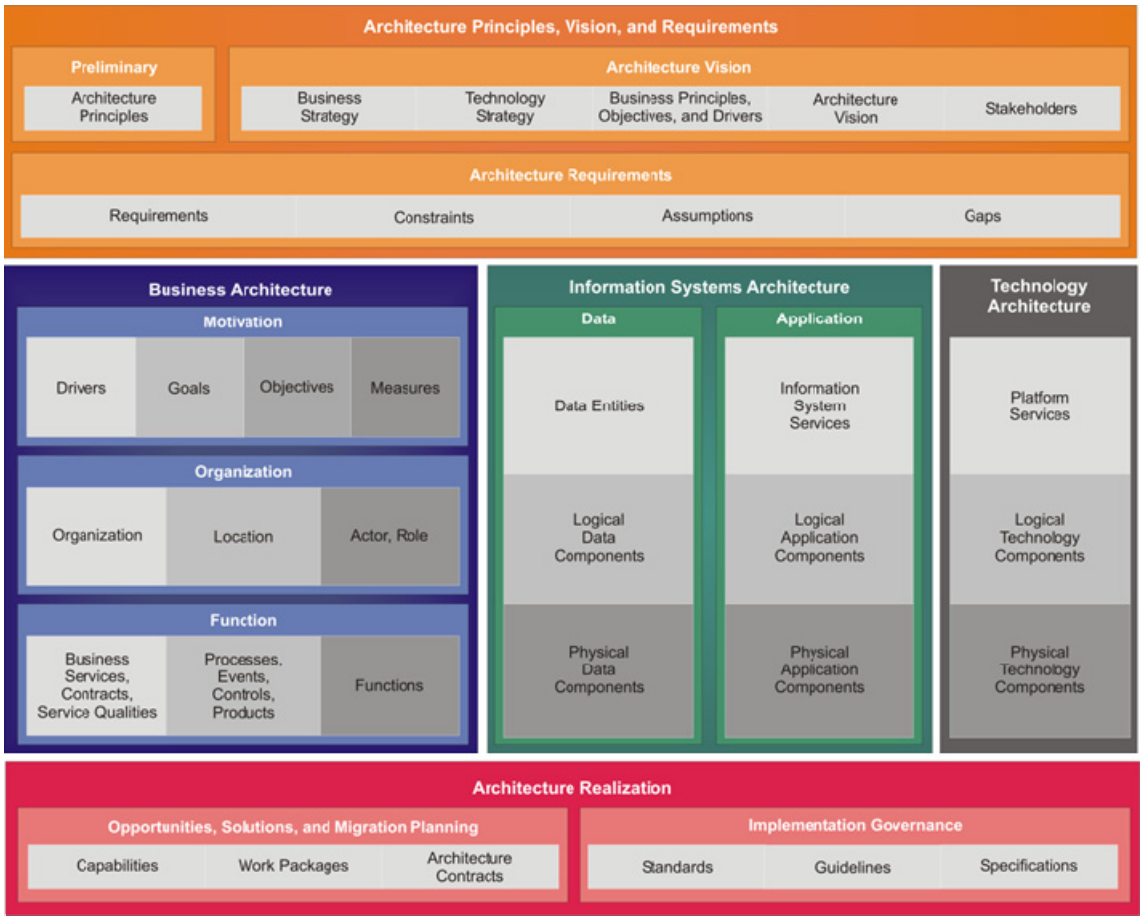

Figure 3: TOGAF Content Metamodel, upon which the Architecture Content Framework (ACF) is Based

Figure 4 shows the artifacts delivered in each phase of the ADM.

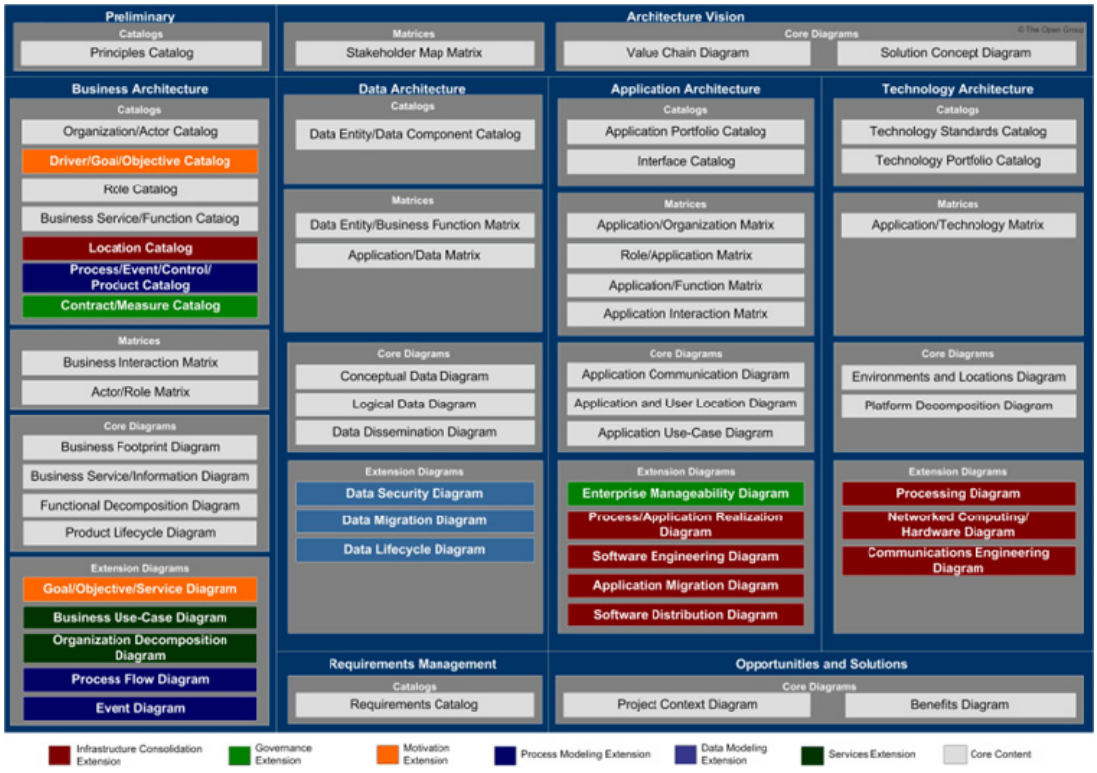

Figure 4: Architectural Artifacts by ADM Phase

ArchiMate

Core Concepts

ArchiMate [5], an Open Group standard, is an open and independent modeling language for Enterprise Architecture (EA) that is supported by different tool vendors and consulting firms. It provides uniform representations for diagrams that describe EAs. Its core concepts (Figure 5) specify three main types of elements that are in turn often used to represent classes of real-world entities. These element types are:

- *Active structure* elements are entities capable of performing behavior.
- *Behavior* elements are units of activity performed by one or more active structure elements.
- *Passive structure* elements, upon which active structure elements perform behavior.

ArchiMate specializes two of these core element types to enable service-oriented architectural viewpoints:

- Behavior elements known as *services* are units of functionality that systems expose to their environments. Services deliver value to their consumers while concealing the internal operations of the systems that expose them.
- Active structure elements known as *interfaces* are points of access where systems expose one or more services to their environments.

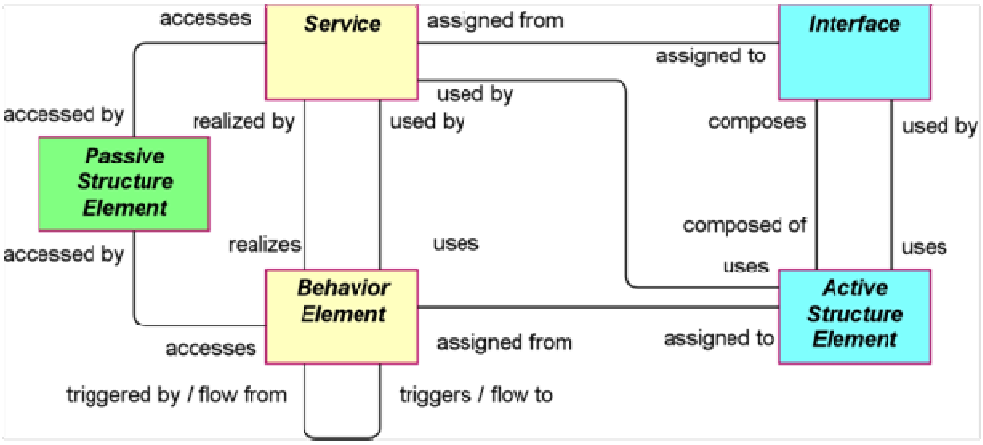

Figure 5: ArchiMate Core Concepts

ArchiMate differentiates between behavior that is performed by a single active structure *versus* interactions performed by a temporary *collaboration* of multiple structures (Figure 6).

ArchiMate contains a core set of relationships, many of which should be familiar to users of the Unified Modeling Language (UML) and Business Process Modeling Language (BPML). These relationships fall into three categories:

- *Structural* relationships model the structural coherence between structural or behavioral concepts of the same or different types. They include *association, access, used by, realization, assignment, aggregation*, and *composition*.

- *Dynamic* relationships model dependencies between behavioral concepts. They include *flow* and *triggering*. In addition, ArchiMate enables the derivation of dynamic relationships between structural elements to which the behavioral functions are assigned. For example, modelers can depict a flow relationship between two application functions as a flow relationship between separate application components that perform those functions.
- Other relationships are neither structural nor dynamic. They include *grouping, junction*, and *specialization*.

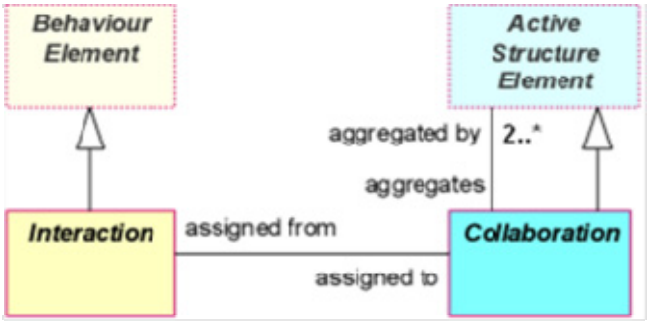

Figure 6: Collaboration and Interaction in ArchiMate

ArchiMate defines three main layers based on specializations of its core concepts:

- The *Business Layer* models products and services available to external customers of the organization that is being modeled. These services are realized by *business processes* performed by *business actors*.
- The *Application Layer* provides the Business Layer with *application services* that are *realized* by software applications.
- The *Technology Layer* provides the infrastructure services such as data processing, storage, and communications necessary to run applications. These services are realized by computing and communications hardware and system software.

ArchiMate combines its three layers with its three core element types to form a framework (Figure 7) of nine cells.

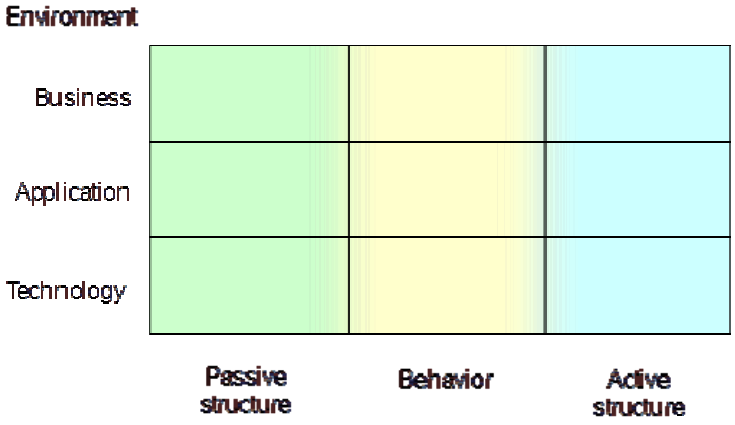

Figure 7: ArchiMate Framework

Extensions

To its nine-cell core framework, ArchiMate 2.0 adds two extensions:

- The *Motivation* extension models the elements that motivate enterprise design and operation. Its concepts include: *stakeholder, driver, assessment, goal, requirement*, and *principle*.
- The *Implementation and Migration* extension models the implementation of all aspects of EAs, as well as the migration between generations of implemented architectures. Its concepts include: *work package, deliverable, plateau*, and *gap*.

Viewpoints

ArchiMate also includes a set of architecture viewpoints that can be used by themselves or in conjunction with the TOGAF Architecture Content Framework (ACF). ArchiMate classifies viewpoints in two ways (Figure 8):

- *Purpose*, which may be *Designing* a solution, *Deciding* on a course of action, or *Informing* employees, customers, or other stakeholders.
- *Abstraction* levels, which may embody the *Details* needed by stakeholders such as software and process engineers, the systemic *Coherence* needed by operational managers who must understand key relationships to solve problems and implement change, or the *Overview* needed by executives, Enterprise Architects, and others who must make key decisions and manage change.

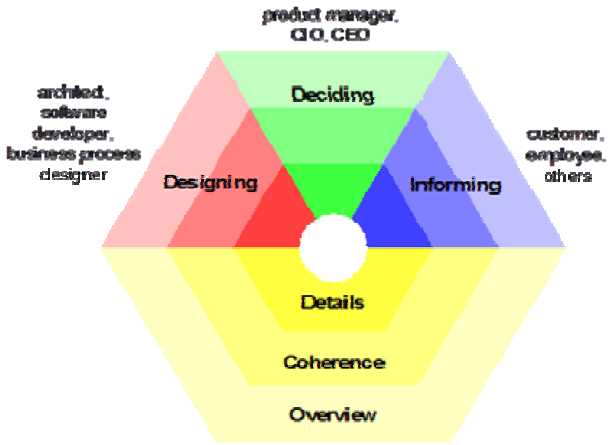

Figure 8: Classification of Enterprise Architecture Viewpoints

ArchiMate as a Modeling Language for TOGAF

The ArchiMate modeling language, together with its two extensions, can be used to model architectures developed using the TOGAF ADM. Figure 9 shows the correspondence between the activities of ADM phases and the parts of the ArchiMate language. Previous Open Group White Papers [6][7] demonstrate this correspondence. This White Paper models ACORD concepts using the ArchiMate language, and shows how those concepts apply to the TOGAF ADM.

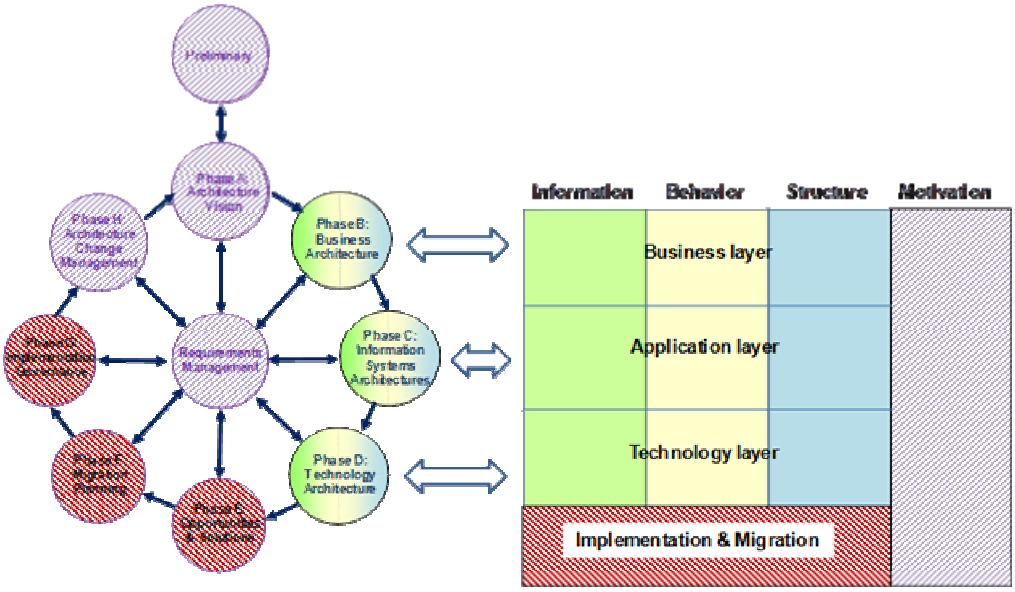

Figure 9: Correspondence between ADM Phases and the ArchiMate Framework

The ACORD Initiatives

ACORD is a global, non-profit standards development organization serving the insurance industry and related financial services organizations. The ACORD mission is to facilitate the development of open consensus data standards and standard forms. ACORD members include hundreds of insurance and reinsurance companies, agents and brokers, software providers, and industry associations worldwide. ACORD works with these organizations towards improved data communication across diverse platforms through implementation of standards. ACORD maintains offices in New York and London.

ACORD is a member-driven organization whose members work together to improve the flow of insurance information between systems and partners. ACORD standards and services improve data quality and transparency, resulting in greater efficiency and expanded market reach.

ACORD was established in 1970, released its first standard forms in 1972, and published its first electronic information exchange standards in 1982. Today, ACORD is the predominant global insurance data and process standards organization, consisting of 243 insurance carriers, reinsurers, agents, brokers, and financial services companies, 164 solution providers, and 42 industry associations and user groups [8]. In addition, ACORD membership includes many of the largest insurance companies in the world (Table 1).

Table 1: ACORD Membership among the Largest Insurance Companies [9]

	Membership Participation Percentage of Largest Insurance Organizations		
Industry Sector	Property & Casualty	Life & Annuity	International Groups
Top 10	80	40	50
Top 25	72	56	52
Top 50	66	38	42
Size Metric	2009 Direct Written Premium	2009 Net Written Premium	2011 Net Premium Written

ACORD manages a broad array of standards for insurance data exchange as well as the ACORD framework, which is not a standard for data exchange, but rather a framework for insurance business and application architecture. However, ACORD is working to converge the framework and its standards so that future versions of its standards will be built on the framework. Figure 10 gives an overview of ACORD initiatives modeled as a set of *products*, for which visual *nesting* indicates *composition*; i.e., a hierarchy where one object owns or permanently consists of another.

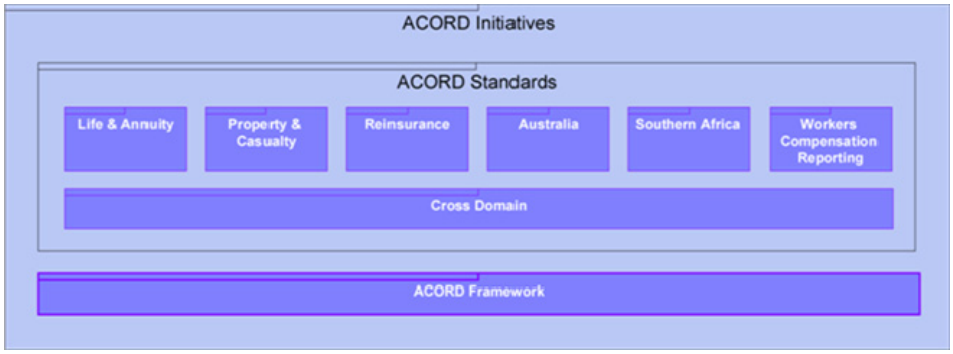

Figure 10: ACORD Initiatives

The two types of ACORD initiatives in Figure 10 have different purposes. The ACORD standards enable communication between insurance computer systems, both within and across organizations, while the ACORD framework enables and standardizes insurance industry EA as a whole. In addition, the ACORD standards pre-date the ACORD framework by about two decades, and their models are not yet fully aligned. However, the framework and standards can be used together today. As the case study later in this document demonstrates, the framework and standards each model content that is sufficiently distinct so as to render most discrepancies irrelevant for EA purposes.

ACORD organizes its standards programs primarily by three major sectors of the global insurance industry:

- Life and Annuity (L&A)
- Property and Casualty (P&C)
- Reinsurance (Re)

The ACORD standards portfolio also includes country-specific L&A standards for Australia and Southern Africa, special-purpose standards for Workers' Compensation Reporting, and a set of Cross-Domain standards.

The ACORD Cross-Domain Standards

Each of the ACORD Cross-Domain standards (Figure 11) applies to multiple business areas, and provides a foundation for the design or usage of other standards. The ACORD Messaging Service XML Specification and SOAP Implementation Guide [10], and the ACORD Web Services Profile [11] together define a *messaging service*, including message *transport*, *routing*, and *packaging* for the exchange of domain-specific ACORD XML messages. These standards specify in detail the functionality necessary to exchange domain-specific messages, and how implementers can leverage Internet standards such as SOAP and HTTP. In this way, it enables domain-specific ACORD standards developers to focus on insurance data content while leveraging a complete implementation architecture. Figure 12 outlines the ACORD Messaging Service as an *aggregation* or grouping of ArchiMate *infrastructure services* realized by identically named *infrastructure functions*. The Inbox and Outbox functions respectively enable one-way client-to-server and server-to-client message flows, and are each *composed* of three more specialized functions. The Call function enables synchronous request-response messaging, while the Ping function is a stateless operation that provides an initial basic client-server handshake for the purpose of determining server availability.

The *Security Profiles* for the ACORD Messaging Service [12] specify the security requirements for exchanging ACORD messages, and provide a set of security profiles that allow implementers to incrementally progress the level of message security through four states: Initial, Basic, Medium, and Maximal. Each profile specifies in detail a combination of mandatory and optional techniques for each level. The techniques are based on well-established standards such as Web Services Security (WSS) [13] and Secure Sockets Layer/Transport Layer Security (SSL/TLS) [14].

Figure 11: ACORD Cross-Domain Standards

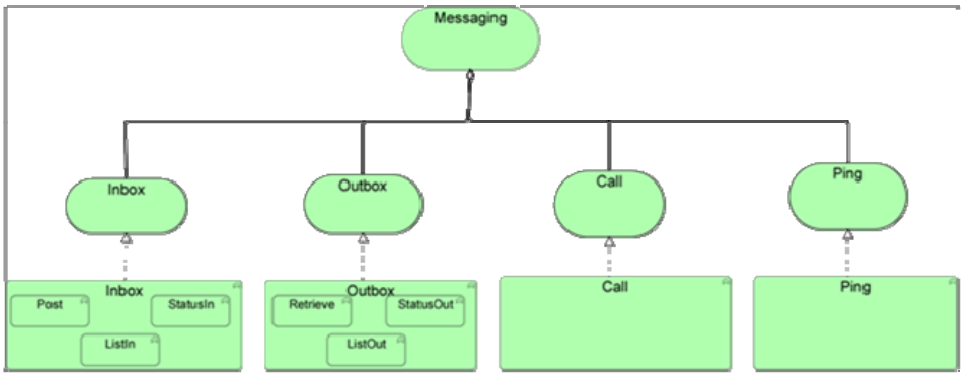

Figure 12: ACORD Messaging Service

The ACORD XML *Naming and Design Rules* (NDR) [15] specification further supports the consistency of ACORD standards by defining how they use XML. ACORD ultimately intends to enable implementers and extenders of its standards to generate compliant XML directly from the ACORD Business Glossary. However, the current Business Glossary is not structured for this purpose. The NDR specification also declares that ACORD XML schemas will be derivable from message and data component descriptions specified in a specific subset of UML. Consequently, many ACORD standards are available in UML form.

The ACORD *Document Repository Interface* (DRI) [16] specifies a set of XML-based interactions for trading partners to identify, describe, search for, request, package, send, and receive documents. For example, insurance carriers commonly exchange a variety of documents with parties such as brokers and reinsurers. The DRI also supports the role of intermediaries that may collect, store, and redistribute documents that are produced and consumed by other parties. The DRI specification contains an appendix with an example DRI specialization for the Re program.

The ACORD Life and Annuity (L&A) Standards

Each of the ACORD standards programs maintains an XML-based messaging standard based on its Cross-Domain messaging standards. This White Paper uses the L&A program [17] as an example. The L&A program covers life insurance, illustration (financial modeling and explanation of products for potential customers), life reinsurance, individual and group insurance, annuities, employee benefits, long-term care insurance, and disability insurance. L&A program standards (Figure 13) include a *Data Model*, which defines data needed for business partners to communicate, along with *Forms*, flat file *Message Formats*, and *XML Messages* based on them.

Since the XML Message Formats are most closely aligned with the strategic direction of ACORD, they warrant a closer look. The L&A XML Message Formats are based on an object model with three document types identified by their root elements. Figure 14 models these document types as ArchiMate *data objects* that share a *grouping*.

The TXLife document type (Figure 15) aggregates a broad range of ACORD transaction message types. They include requests for both user authentication and a wide variety of business transactions, as well as both synchronous and asynchronous response messages, which are also known as notifications. The XTbML document type provides a very specialized format for the automated exchange of actuarial tables. The OLife document type (Figure 16) models the L&A *business area message model*; i.e., the business objects

represented within TXLife messages. The data types within the OLife document type support a broad range of TXLife transaction requests (Figure 17).

Figure 15 shows the types of transaction messages in the second row of data objects. The OLifE Extension object allows users to extend the document type.

Figure 16 shows the high-level categories of data objects represented within TXLife messages.

Figure 17 shows specializations of the TXLifeRequest object, showing the wide variety of transaction messages supported by the ACORD LAH XML Message Formats.

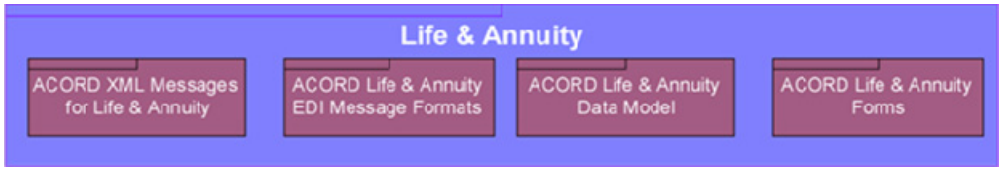

Figure 13: ACORD Life & Annuity Standards

Figure 14: The Three Schemas within the LAH XML Message Formats Standard

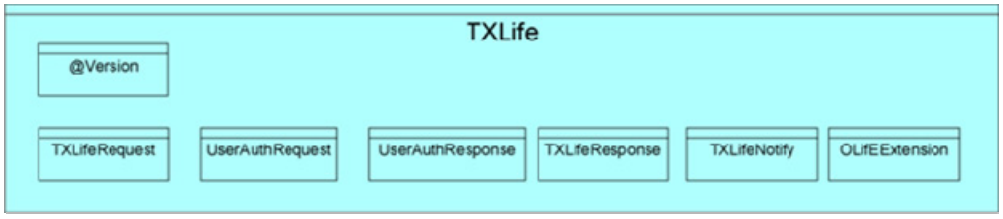

Figure 15: The TXLife Document Type

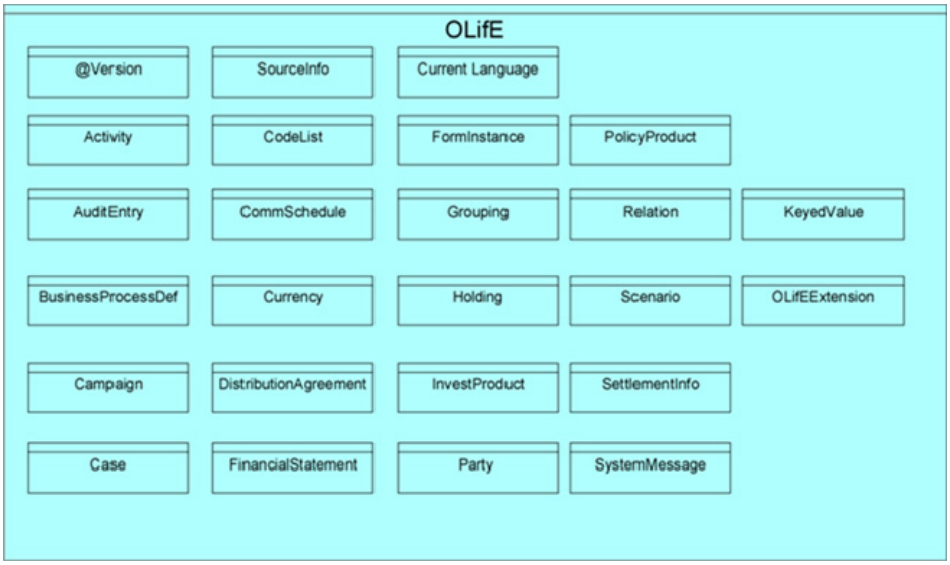

Figure 16: The OLifE Document Type

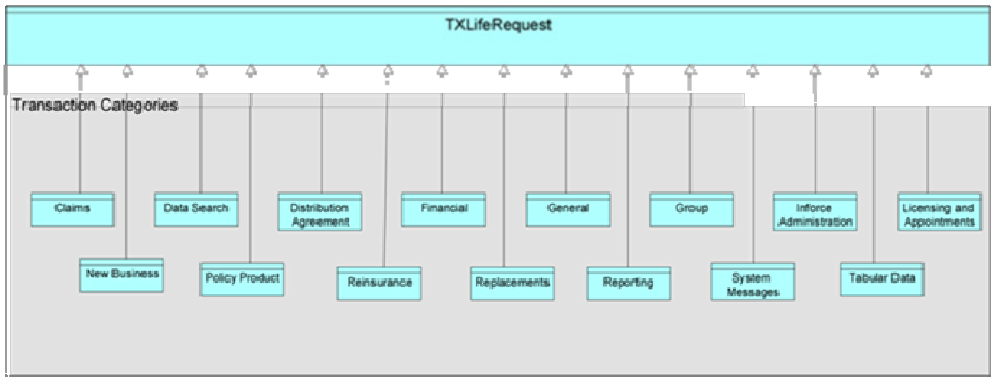

Figure 17: Transaction Categories that Specialize TXLifeRequest

A model of an example TXLifeRequest transaction request (Figure 18) object illustrates these concepts. The transaction is a New Business Submission Transaction Request. The example illustrates the simplest form of this transaction, the General New Business Application Submission subtype. This request could be generated, for example, by an interactive system to transmit an application for individual life insurance to a back-end system for processing. The transaction object consists of the elements below, with defining OLifE classes in angle brackets.

Required attributes:

- Main <Holding>: The insurance or other financial services product that the applicant is requesting or purchasing.
- Insured <Party>: The individual or organization that the product is to insure.
- <ApplicationInfo>: Holds information about the application process and the application itself.

Optional attributes, which are available as necessary for particular circumstances:

- Additional <Holding>: Additional products that the applicant is requesting, purchasing, replacing, or exchanging.
- Beneficiary <Party>: The individual or organization designated to receive the product benefits if the covered risk actually occurs.
- <Relation>: The relationships between beneficiaries and holdings.
- <MIBRequest>: Information necessary to request fraud protection or risk assessment services connected with the insurance application from the *MIB Group, Inc.* [18], an association of approximately 470 US and Canadian insurers.

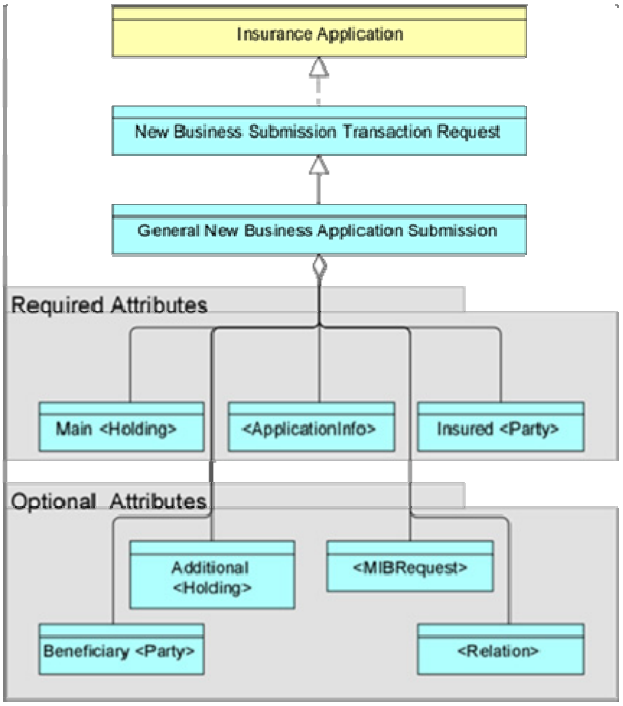

Figure 18: Example TXLife Transaction Request

The example in Figure 18 is modeled in ArchiMate as an aggregate data object that specializes another data object that in turn realizes a business object, the application for insurance.

The ACORD Framework

The ACORD framework (Figure 19) [19] is a set of five models, known as *facets*, that represent the nature of the global insurance industry from different perspectives. The framework also represents the ACORD strategic direction for standards development and maintenance. It is a common industry paradigm for both information exchange and EA that guides the development of reference architectures, services and software components, and application and data integrations. ACORD is developing the framework in order to enable insurance businesses to focus on their core competencies and improve both the agility of their business models and their collaboration with industry partners. The framework is also designed to improve the agility

and efficiency of process and system development and ease standards development. Each of its facets warrants a closer look.

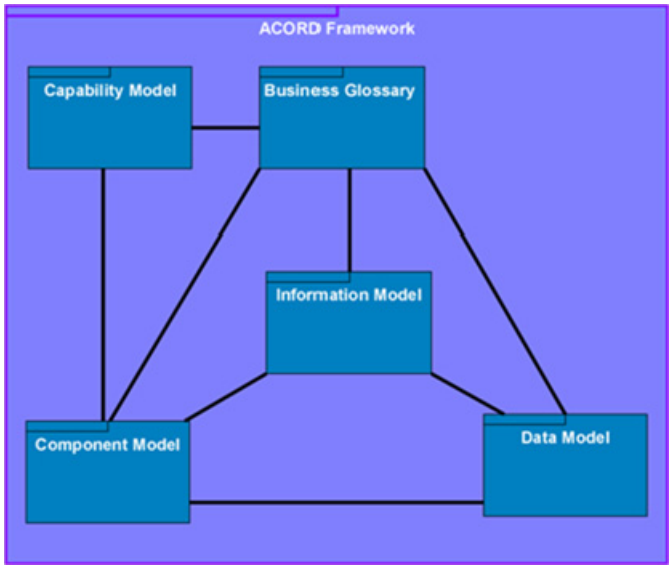

Figure 19: The ACORD Framework

The ACORD Information Model

The Information Model is the core of the ACORD framework. It provides an overall view of the insurance industry through key concepts and their relationships, facilitates development of interoperable business processes, and will ultimately provide a semantic link to all ACORD standards. The Information Model is organized as a hierarchy of packages, and includes worked examples and reference metadata. Figure 20 depicts Information Model packages as ArchiMate *business objects*.

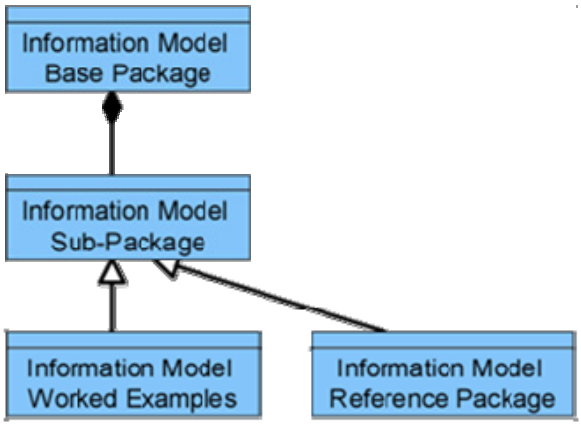

Figure 20: Metamodel of the ACORD Information Model

Table 2 lists the top-level Information Model classes with the base packages that represent their members, while Figure 21 depicts a partial overview of the Party Package. The orange business objects are part of the Party class, while the blue business objects are part of other classes. Note that the Party business object

specializes the generic Information Model Object. This relationship holds for all top-level Information Model classes.

Table 2: ACORD Information Model Base Packages (in boldface) with Top-Level Classes

Base Package	Top-Level Class(es)
Activity	Activity
Agreement	Agreement
Assessment and Condition	AssessmentActivity, AssessmentResult
Category	Category, Category Scheme
Claim	ClaimBase, ClaimElement
Common Elements	Information Model Object
Contact and Place	ContactPoint, ContactPreference, Communication Point, Communication Profile, Place
Document and Communication	Communication, Document, CommunicationandContentSpecification
Event	Event
Finance	Account, AccountEntry, FinancialProvision, FinancialProvisionElement, Installment, PaymentMethod, FinancialScheduler
Investment	Trade Order, Trade Rule
Marketing	MarketingCampaign, MarketingObjective, PartyMarketingInformation
Party	Party, Party Detail
Physical Object	PhysicalObject, StructureDetail, ManufacturedItemSpecification
Product Specification	ProductSpecification
Registration	Registration
Role and Relationship	Capability,Role, PartyRoleRelationship

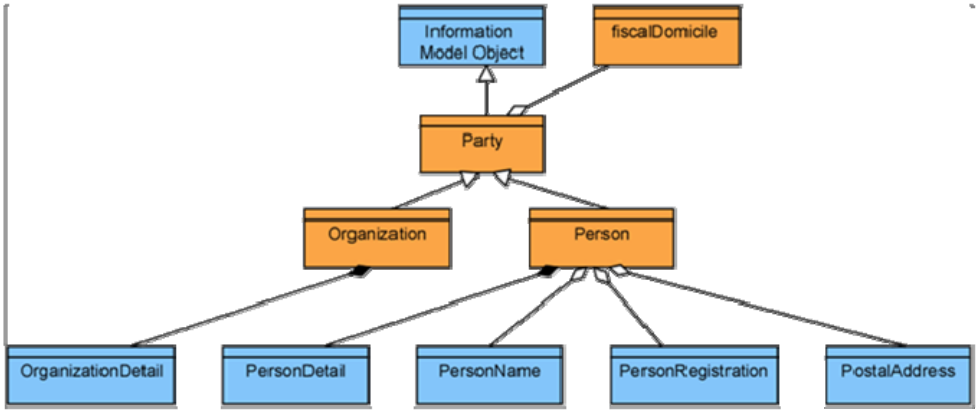

Figure 21: Partial Overview of the ACORD Information Model Party Package

Figure 21 shows a partial overview in which classes are modeled as ArchiMate business objects. The orange business objects are part of the Party class, while the blue business objects are part of other classes. Note that contact information about the organization is contained within the OrganizationDetail business object.

The ACORD Capability Model

This model (Figure 22) describes the activities that insurance companies must perform. Even though the capabilities of individual insurance companies clearly vary, all capabilities in the model exist in the global insurance industry. The Capability Model offers an organizational baseline or preferred taxonomy of the insurance industry's usual way of doing business. Therefore, it facilitates business organization and assessment as well as innovation through identification of common and unique aspects of each organization. The model is organized hierarchically, with three levels of capabilities, the lowest level of which is further decomposed into processes. The Capability Model provides only brief documentation for each process, leaving full definition up to the implementing organization. This hierarchy is regular and fixed; each capability has two levels of sub-capabilities, only the second level of sub-capabilities is composed of processes, and each sub-capability and process has a single parent. Both processes and capabilities may have metrics associated with them. Table 3 lists all the capabilities and their sub-capabilities, while Figure 23 depicts an example of the full depth of the hierarchy.

ArchiMate 2.0 does not have a capability concept, but the ACORD Framework Capability Model Version 2.1 [19] explicitly defines capabilities as groupings of business behaviors:

"*The premise for the Model is that any industry's business architecture is based on a set of discrete business functions, referred to as capabilities. These capabilities define WHAT the business does, and can be broken down functionally … The ACORD Capability Model serves as the foundational layer of the required business capabilities that the insurance industry does or could do …*"

The ArchiMate 2.0 specification [5] compatibly defines a business function as a "behavior element that groups behavior…". Therefore, the ArchiMate definition of business function fits the ACORD definition of capability, and the ArchiMate views in Figure 24 and Figure 25 depict capabilities as *business functions*, and their constituent processes as ArchiMate *business processes*. These views do not, however, depict ACORD capability and process metrics. ArchiMate modelers can treat each set of metrics for a capability or process as a *profile attribute* of specialized versions of these concepts. Many modeling tools enable the display of such attributes on or near the concept symbols.

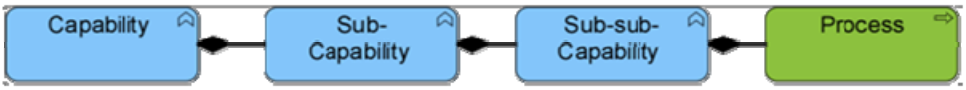

Figure 22: Metamodel of the ACORD Capability Model

Capability	Sub-Capabilities
Business Management	Strategic and Enterprise Planning, Stakeholder and External Relations Management, Enterprise Effectiveness Management
Channel Management	Channel Strategy, Channel Planning, Channel Development, Producer Management, Channel Execution
Contract Administration	Contract Investment Administration, Contract Lifecycle Management
Claims	Claims Strategy, Claims Planning, Claims Management
Customer Service	Customer Relationship Strategy, Customer Relationship Planning, Customer Relationship Management
Enterprise Services	Project Management, Risk Management, Facilities Management, Information Technology Management, Procurement, Human Resources Management, Document Imaging
Finance	Financial Planning, Financial Management, Billing and Payments, General Accounting

Capability	Sub-Capabilities
Product	Product Strategy, Product Planning, Product Development, Product Portfolio
Marketing	Marketing Strategy, Marketing Planning, Marketing Execution
Sales	Contract Acquisition

Table 3: ACORD Capability Model Capabilities and Sub-Capabilities

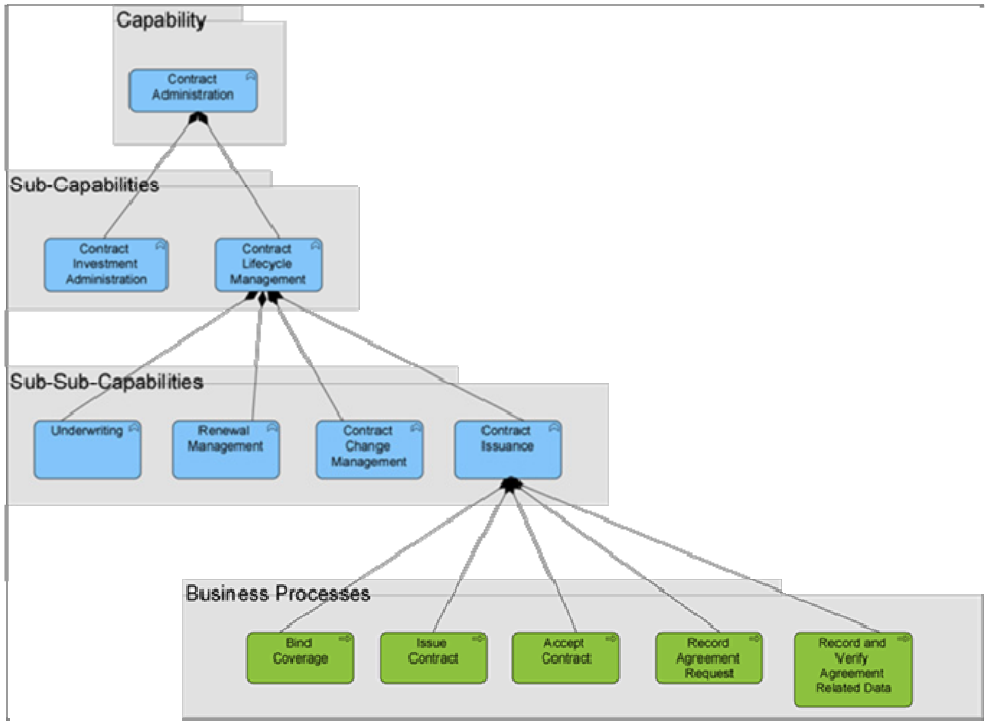

Figure 23: Partial Overview of the ACORD Framework Contract Administration Capability

Works in Progress: Business Glossary, Data Model, and Component Model

While this White Paper has explored the Information and Capability Models in some detail, it will only summarize these three framework facets, since they are undergoing significant development. The ACORD Business Glossary (Figure 24) is a common vocabulary for the insurance industry. It provides a comprehensive list of insurance business terms mapped to the insurance business areas that use them, along with their definitions and synonyms. The glossary is free of any technological considerations and can be used as a base for developing localized, company-specific, and industry-wide reference materials. Therefore, it provides a shared context for all ACORD framework elements and standards. Figure 24 depicts all Business Glossary elements as ArchiMate *business objects*.

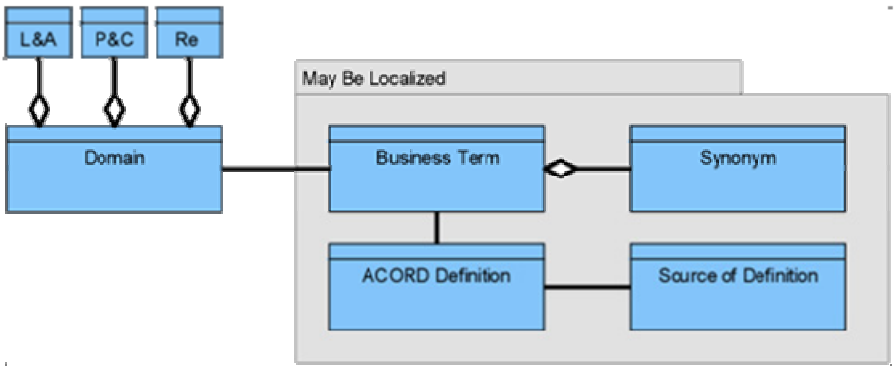

Figure 24: Metamodel of the ACORD Business Glossary

The ACORD Data Model (Figure 25) provides logical-level entity-relationship models of insurance concepts. This framework facet facilitates data store design and assessment based on Information Model concepts. Like the Information Model, the Data Model is organized as a hierarchy of domains and delivered as a set of packages. Figure 25 models all Data Model elements as ArchiMate data objects.

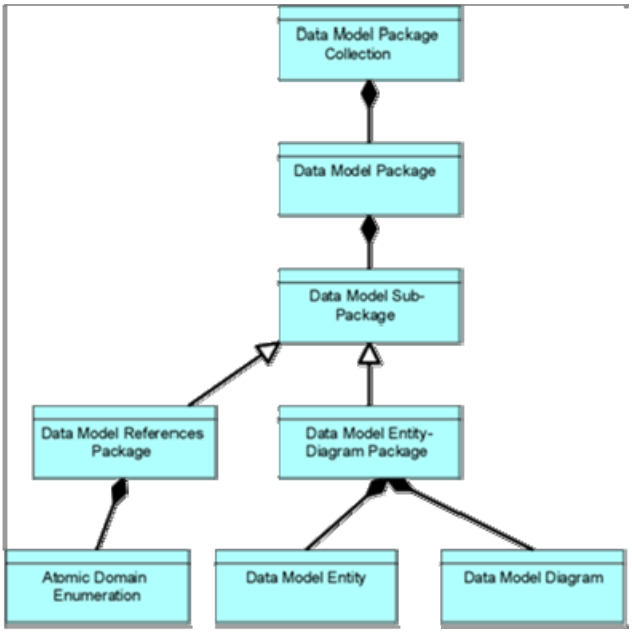

Figure 25: Metamodel of the ACORD Data Model

ACORD is currently revising the Business Glossary and Data Model to align them with the Information Model. When this work completes, the Business Glossary will, in ArchiMate terms, specify the *meaning* of each business object, and the Data Model will specify the *data objects* that *realize* the *business objects* in the Information Model. The first version of the Component Model, however, is currently under development. When it is complete, the Component Model will, in ArchiMate terms, specify the *application services used by business processes*, the *application components* that *realize* those services, and the ACORD standard message *data objects* that the *application components access*; i.e., read or write. These messages will *aggregate data objects* from message models specific to particular business areas; i.e., Life and Annuity

(L&A), Property and Casualty (P&C), and Reinsurance (Re). These business area-specific message *data objects* will be *associated* with Data Model *data objects* via mapping documents issued by ACORD. Figure 26 depicts these target-state relationships.

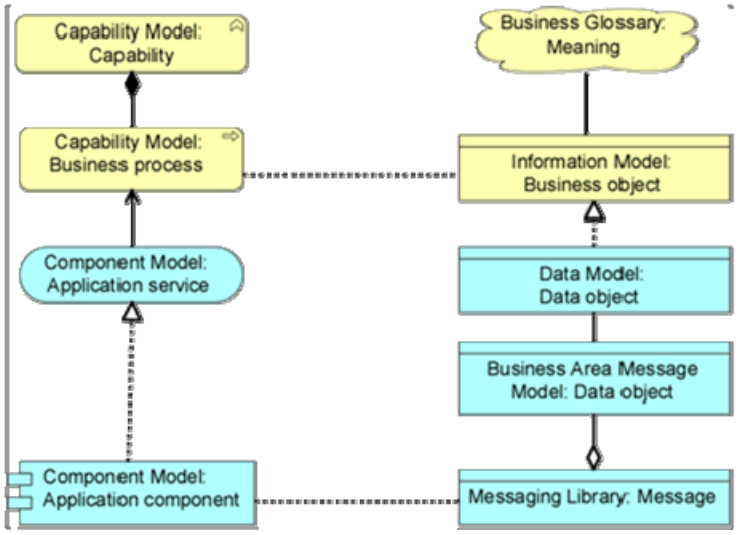

Figure 26: Target-State Relationships between Key Concepts of the ACORD Framework and the ACORD Messaging Standards

Case Study: New Business Setup for Group Term Life Insurance

This section of the White Paper builds on the ArchiSurance Case Study, recently published by The Open Group [20]. ArchiSurance is a fictional insurance company created from the merger of three predecessor companies. In this case, ArchiSurance acquired a company that provides group term life insurance. The group term life insurance business uses a different set of applications and business processes than the Property and Casualty (P&C) insurance businesses that ArchiSurance inherited from its predecessor companies. For ArchiSurance, one major new process is New Business Setup for Group Term Life Insurance.

Business Process View

The ArchiMate Business Process view (Figure 27) uses business processes defined by the ACORD Capability Model, and business objects defined by the ACORD Information Model. New Business Setup begins when an institutional customer – e.g., an employer – initiates an insurance application based on a quote from ArchiSurance, which plays the role of the Insurance Carrier in Figure 27 and Figure 28. When ArchiSurance receives the application, it records and verifies the data related to the forthcoming agreement to provide group life insurance. Then, assuming the application is valid, ArchiSurance then *binds coverage*; i.e., puts a policy in effect for the institutional customer. Then, ArchiSurance issues the insurance contract to the institutional customer, who then reviews and accepts it. For simplicity, Figure 27 and Figure 28 omit certain negative outcomes, such as the customer requesting a revised contract instead of accepting it outright.

When ArchiSurance receives back the signed contract, it performs a series of processes to prepare customer information for the new carrier-customer relationship. These processes involve creating or updating the customer identity information that ArchiSurance must maintain to insure its customer. Next, ArchiSurance sets up the invoicing necessary to collect the agreed premium from the customer. This premium typically varies according to the number of customer lives insured under the agreement. For example, if the customer is an employer whose payroll expands, then the premium typically rises. To facilitate convenient and accurate premium invoicing, ArchiSurance establishes regular automated information exchange of customer census information. Finally, ArchiSurance addresses any changes in contracts with its business partners necessary to fulfill the terms of the insurance contract. For example, ArchiSurance might engage a contractor to educate insured individuals on health and safety practices in order to fulfill a provision of the insurance contract.

Once the necessary customer information is in place, ArchiSurance takes a number of steps to maximize the financial performance of the agreement. The company analyzes the need for reinsurance to mitigate the risks of extreme financial liability; e.g., from paying potential claims of group members who have insured their lives for large sums of money. If necessary, ArchiSurance cedes risk to a reinsurer that will reimburse ArchiSurance for certain losses under the original group term life insurance contract in return for payment of a reinsurance premium.

At the same time that it arranges for reinsurance, ArchiSurance analyzes the reserve requirements for the new group term life insurance contract in order to determine how much of the premium that it collects must be kept in highly stable and liquid investments in order to pay claims. Once ArchiSurance has both analyzed its reserve requirements and satisfied any requirement for reinsurance, it can then appropriately invest the premium it receives.

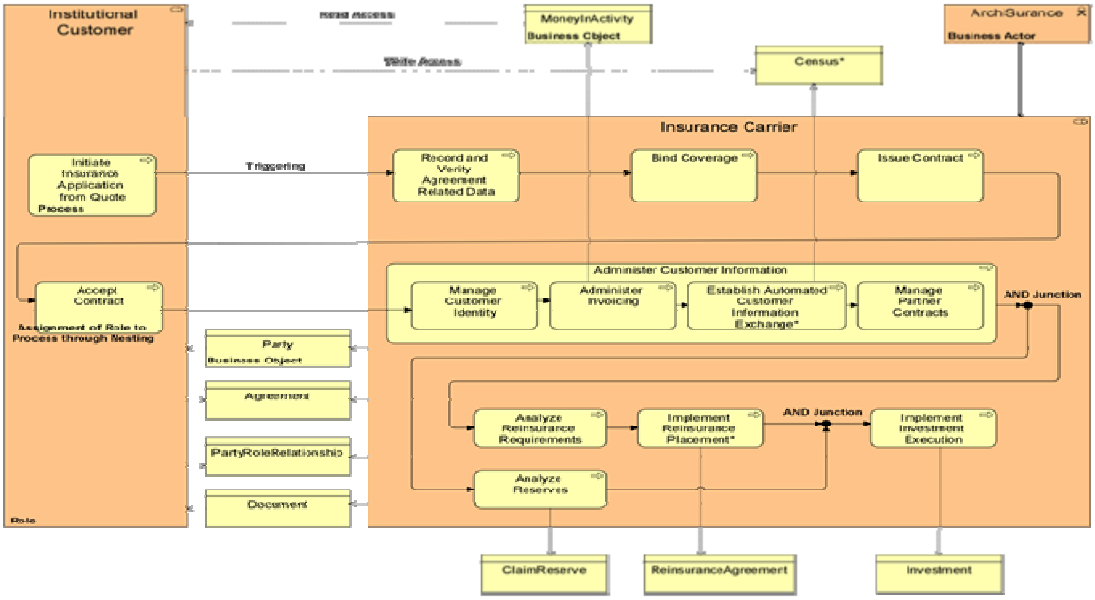

Figure 27: ArchiMate Business Process View of New Business Setup for Group Term Life Insurance

In Figure 27, entities marked with an asterisk (*) would be useful additions to the ACORD Capability or Information Models. For simplicity, this view depicts access to some versatile business objects at the role rather than process level.

Application Usage View

The ArchiMate Application Usage view (Figure 28) uses data objects defined as messages by the Life & Annuity messaging standard, as well as application components and services comparable to those that will be defined in the forthcoming ACORD Component Model.

The first four processes in New Business Setup for Group Term Life Insurance use four different messages defined by the ACORD Life & Annuity messaging standard [17]:

- UserAuthRequest: Used to authenticate users at the application level.
- TXLifeRequest: New Business Submission Transaction (tc[1] =103). Provides a means for sharing proposed policy information for application submission.
- TXLifeRequest: Holding Transmittal Transaction (tc=1203). Used to share information about an insurance policy or other financial instrument.
- TXLifeRequest: Fund Transfer Transaction (tc=102). Used to initiate a one-time transfer of money from one or more source funds to one or more destination funds.

[1] tc = transaction code.

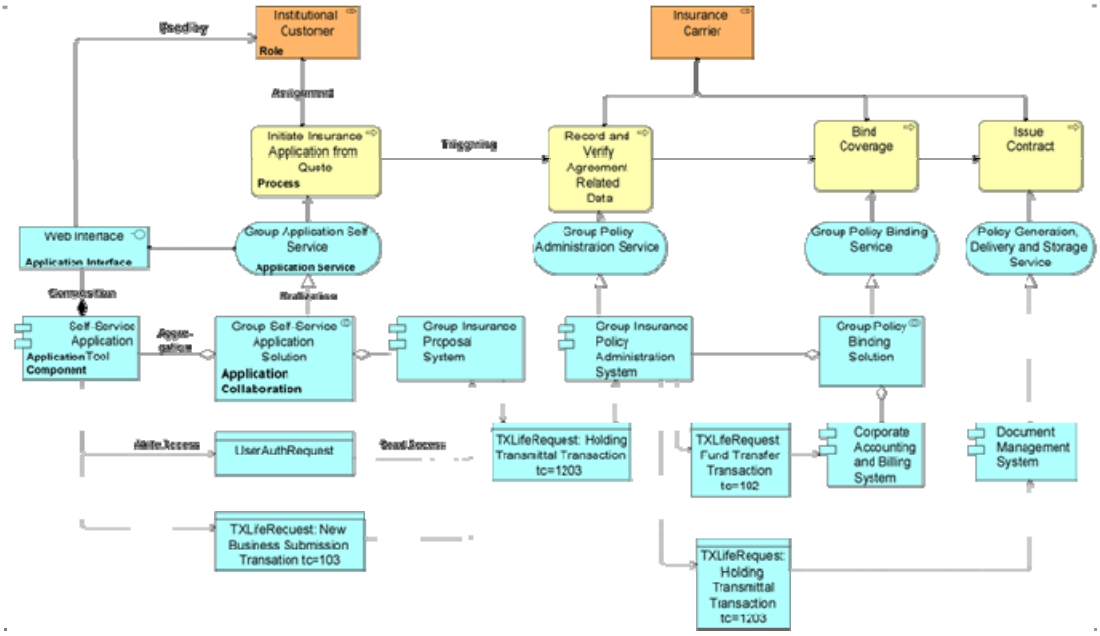

Figure 28: Application Usage View of the First Four Business Processes involved in New Business Setup

Analysis

While previous sections of this White Paper have introduced ArchiMate models of ACORD concepts, this section more broadly explores why and how Enterprise Architects should integrate TOGAF, ArchiMate, and ACORD concepts and methods.

Positioning ACORD along the TOGAF Architecture Continuum

The TOGAF Architecture Continuum (Figure 29) is not a formal or discrete classification of architectures, but rather a progression, typically depicted from left to right, from:

- Logical to physical
- Horizontal, or IT-focused, to vertical, or business-focused
- Generalization to specialization
- Taxonomy to complete and specific architecture definition

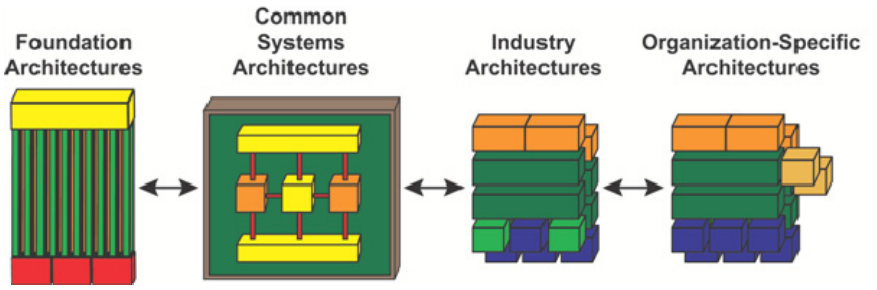

Figure 29: The TOGAF Architecture Continuum

The TOGAF Architecture Continuum differentiates between different types of architectures (Figure 30) and illustrates their relationships. It distinguishes between:

- *Foundation architectures* which consist of generic concepts and relationships that can be assembled into a very wide variety of more specific architectures. The TOGAF Technical Reference Model (TRM) is such a model, since it lists a generic set of components and services from which a wide variety of solutions can be derived.
- *Common system architectures* guide the development of widely re-usable solutions by selecting, elaborating, and integrating components of foundation architectures. The TOGAF Integrated Information Infrastructure Reference Model (III-RM), which is based on the TRM, is an example of a common system architecture.
- *Industry architectures* build on foundation and common system architectures to guide the development of solutions specific to a particular industry. The ACORD framework, for example, is specific to the insurance industry.
- *Organization-specific architectures* guide the development of a solution for a particular organization or a set of interconnected organizations such as National Institutes of Health (NIH), which consists of 27 centrally-managed research organizations within the US Department of Health and Human Services. The NIH EA repository is publicly available [21].

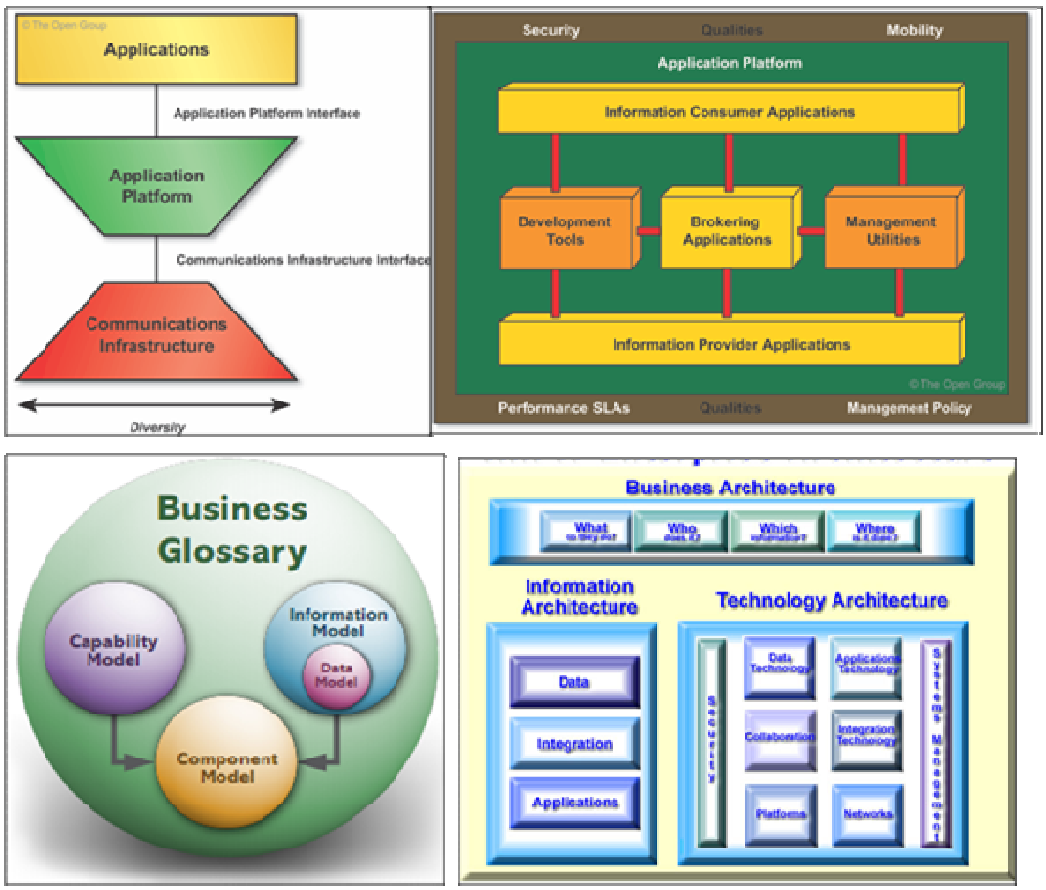

Figure 30: Types of Architecture

In Figure 30, top from left: the TOGAF Technology Reference Model (TRM), a foundation architecture, and the TOGAF Integrated Information Infrastructure Reference Model (III-RM), a common system architecture. Bottom from left: ACORD, an industry architecture, and the IT Enterprise Architecture of the US National Institutes of Health (NIH), an organization-specific architecture.

Relating TOGAF, ArchIMate, and ACORD Concepts

Prior sections of this White Paper use ArchiMate concepts to model and apply the ACORD framework and standards. This section relates key concepts from the ArchiMate language, the ACORD framework and standards, and the TOGAF Content Metamodel, which, at the highest level, is organized by ADM phase.

The nine-cell ArchiMate core framework combines three aspects: Information, Behavior, and Structure, and three layers: Business, Application, and Technology. Figure 31 maps the components of the ACORD framework and standards to these cells, and also to their corresponding ADM phases. The Business Glossary and Information Model both define concepts at the business level, so they map to the Passive Structure (Information) cell of the ArchiMate Business Layer, which in turn corresponds to the Business Architecture ADM phase. The Capability Model, which defines business behavior that insurance organizations perform, maps to the Behavior cell of the Business Layer. The Active Structure cell of the Business Layer is blank, since the ACORD framework does not, for example, define insurance organizational structures or roles. Certainly, many of the capability names, such as Claims, Finance, Marketing, and Sales, are also commonly

used to describe departments and roles in typical insurance companies, but capability and structure are fundamentally different. For example, the management of an insurance carrier could choose to centralize its claims capability in a single organization, or to distribute this capability across departments tied to particular product lines, customer groups, or types of claims.

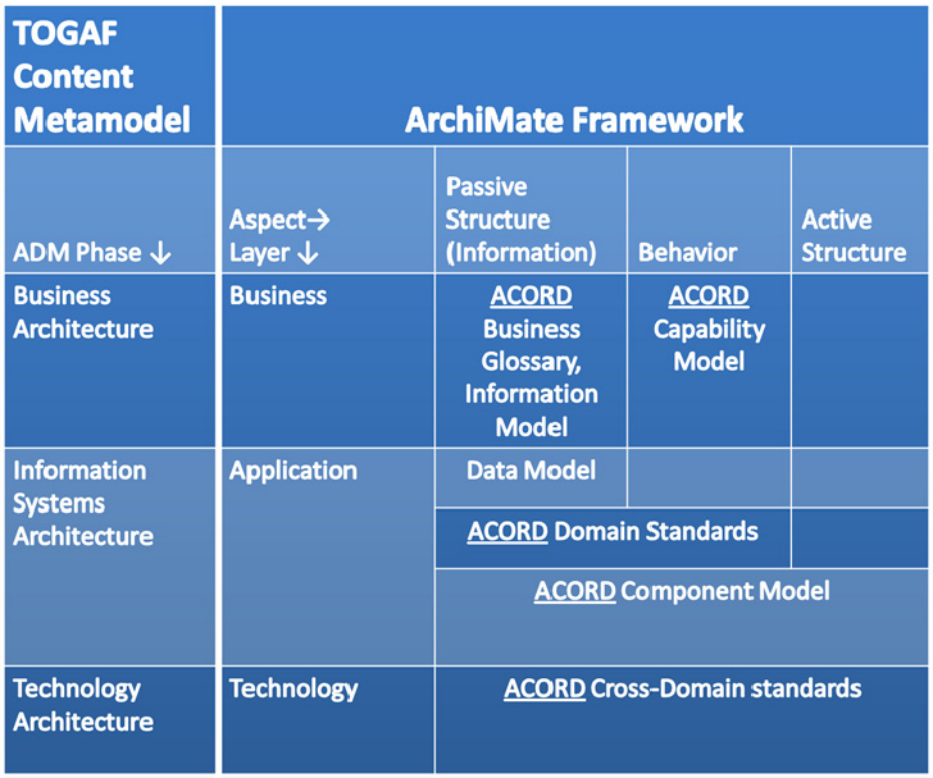

Figure 31: Mapping of the ACORD Framework and Standards Components to the ArchiMate Core Framework

For the ArchiMate Application Layer, which corresponds to the Information Systems Architecture ADM phase, the forthcoming ACORD Component Model will define active structure through a taxonomy of application components, behavior by identifying the services realized by these components, and passive structure or information by identifying the ACORD standard messages that these components produce and consume. Today, the ACORD Data Model defines Passive Structure at the Application Layer by specifying a standard set of data objects, and the ACORD Life and Annuity (L&A), Property and Casualty (P&C), and Reinsurance (Re) messaging standards define both Passive Structure and Behavior by specifying both the structure of messages and the protocols for their exchange.

At the ArchiMate Technology Layer, which corresponds to the Technology Architecture ADM phase, the ACORD Cross-Domain standards specify infrastructure services that allow application components to interoperate as they exchange ACORD standard messages.

Overall, each of the ACORD framework facets and each type of messaging standard maps to an element of the ArchiMate core framework, and also to a corresponding TOGAF Content Metamodel ADM phase component.

Applying the ACORD Framework and Standards to the TOGAF ADM

Background

Prior sections of this White Paper demonstrate how Enterprise Architects can express key concepts from the ACORD framework and standards in ArchiMate views. The Case Study applies these methods to two ArchiMate views of a common insurance business process. This section explores how Enterprise Architects serving the insurance industry can apply the ACORD framework and standards to the TOGAF ADM and, more specifically, to the creation of certain TOGAF artifacts. TOGAF artifacts are model views that take the form of catalogs, matrices, and diagrams. ArchiMate is a natural choice for developing TOGAF diagrams, since ArchiMate is both designed specifically for Enterprise Architecture and fully aligned with TOGAF. However, the recommendations for diagram development in this section are not specific to ArchiMate, and therefore apply to other modeling languages as well.

Preliminary Phase

In the TOGAF Preliminary Phase, organizations select, integrate, and tailor the architecture frameworks for one or more projects. It is in this phase that Enterprise Architects should consider which elements of the ACORD framework and standards are relevant to upcoming efforts. In general, the ACORD framework is broadly useful for developing insurance Enterprise Architectures, while the ACORD standards guide the structuring and enabling of application communications between or within insurance enterprises. Potential users of the ACORD framework should keep in mind, however, that it is not in the public domain, and is available only through the ACORD organization. The ACORD messaging standards, however, are in the public domain, and released versions are available for download on the ACORD website.

During the Preliminary Phase, architecture teams should decide how the ACORD framework and standards will be used throughout the remaining ADM phases. For example, a team could decide to adopt the ACORD Business Glossary for a wide range of artifacts. The remainder of this section gives examples of how the ACORD framework and standards can be used for creating baseline and target architectures in Phase B: Business Architecture, Phase C: Information Systems Architecture, and Phase D: Technology Architecture. Based on these examples, Enterprise Architects should be able to identify additional uses for the ACORD framework and standards in these and other ADM phases.

Phase B: Business Architecture

One of the activities in this phase is the selection and application of relevant business models. ACORD members can use the ACORD Capability Model for baseline and target business architectures. As discussed earlier in this White Paper, the Capability Model consists of hierarchies of business capabilities, with the lowest level of capabilities further decomposed into business processes. The Capability Model is relevant to Phase B artifacts such as these:

- Business Service/Function Catalog, which provides a functional decomposition of the enterprise in a form that can be filtered, reported on, and queried.[2]
- Process/Event/Control/Product Catalog, which provides a hierarchy of processes, events that trigger processes, outputs from processes, and controls applied to the execution of processes.
- Business Interaction Matrix, which depicts interactions between organizations and business functions across the enterprise.

[2] The TOGAF Content Metamodel ([4], Section 34.5) closely aligns the notions of capability and function by stating that a Capability "delivers business capabilities closely aligned to an organization … also referred to as 'business function'".

Also in Phase B: Business Architecture, the ACORD Information Model applies to the Business/Service Information Diagram, which shows the information needed to support one or more business services.

Phase C: Information Systems Architecture – Data Architecture

One of the activities in this phase is the selection of catalogs of data building blocks. The ACORD Information Model is a conceptual map of insurance data, while the ACORD Data Model provides a more detailed logical model. In addition, as noted above, Enterprise Architects can use the ACORD messaging standards to standardize information exchange between and within enterprises. While specific message formats are not typically relevant at the enterprise level, Enterprise Architects may shape their models using aspects of ACORD messaging standards, such as the OLife document type categories (Figure 15) and the TXLifeRequest transaction categories (Figure 16) within the Life & Annuity standard.

Enterprise Architects can apply the ACORD framework and standards to Data Architecture artifacts such as these:

- Data Entity/Data Component Catalog, which identifies all the data used across the enterprise.
- Data Entity/Business Function Matrix, which depicts relationships between data entities and business functions. The ACORD Capability Model also applies here, since it defines business functions.
- Conceptual and logical data diagrams, which show relationships between critical entities.

Phase C: Information Systems Architecture – Applications Architecture

One of the activities in this phase is the selection of relevant Applications Architecture references. Once it is completed and published, the ACORD Component Model will provide standard definitions of insurance application services as well as the application components that realize them. The model will therefore be useful in producing artifacts such as these:

- Application Portfolio Catalog, which identifies all the applications in the enterprise using the following TOGAF Content Metamodel entities: Information System Service, Logical Application Component, Physical Application Component.
- Application/Function Matrix, which shows relationships between applications and business functions. The ACORD Capability Model also applies to this artifact.
- Process/Application Realization Diagram, which shows the sequence of events when multiple applications are involved in executing a business process. The processes defined by the ACORD Capability Model also apply to this artifact.

Phase D: Technology Architecture

As in prior phases, one of the activities in Phase D is the selection of relevant references. Many insurance technology Enterprise Architectures must enable standardized information exchange. The ACORD Cross-Domain standards provide a technical foundation for exchanging ACORD XML messages and interacting with document repositories. Therefore, they are applicable to Phase D deliverables such as these:

- Technology Standards Catalog, which documents the agreed standards for technology across the enterprises.
- Technology Portfolio Catalog, which identifies all the technology across the enterprise, including hardware, infrastructure software, and application software. Enterprise Architects can use the ACORD Cross-Domain standards to refine the TOGAF Technology Reference Model ([4], Section 43) definition

of Application Platform Interface to define Platform Services and Logical Technology Components that support ACORD-based message exchange.

Furthermore, Enterprise Architects can reference Technology Portfolio services and components based on the Cross-Domain standards in artifacts such as these:

- Application/Technology Matrix, which documents the mapping of applications to technology platforms.
- Platform Decomposition Diagram, which depicts the technology platform that supports the operation of the Information Systems Architecture.

Conclusion

The TOGAF and ArchiMate standards add significant value to the ACORD framework and standards. ArchiMate provides a method of representation at each architectural layer that is easily accessible across IT and business disciplines. The lead author of this paper regularly and successfully presents ArchiMate diagrams to insurance industry managers and executives with only general IT familiarity as well as to IT individual contributors with no formal architecture or design training. Some of these diagrams are similar to the Case Study views, Figure 27 and Figure 28. ArchiMate uniquely combines rigorous syntax and semantics with an intuitive visual style that is appreciated and understood even by those with no architectural background.

ArchiMate excels at depicting architectural coherence across layers (Figure 32), whether they are the standard layers defined by TOGAF or ArchiMate, or custom layers designed to meet organization-specific needs. For example, the case study Application Usage view (Figure 28) shows the relationship between the Business and Application Layers associated with the first four sub-processes within New Business Setup for Group Term Life Insurance. At the same time, it relates portions of the ACORD Capability Model, the anticipated ACORD Component Model, and the ACORD Life and Annuity (L&A) messaging standard. Furthermore, as ACORD continues to reconcile and integrate the various elements of its framework and standards, the value of ArchiMate as a means of representing their coherence will similarly increase.

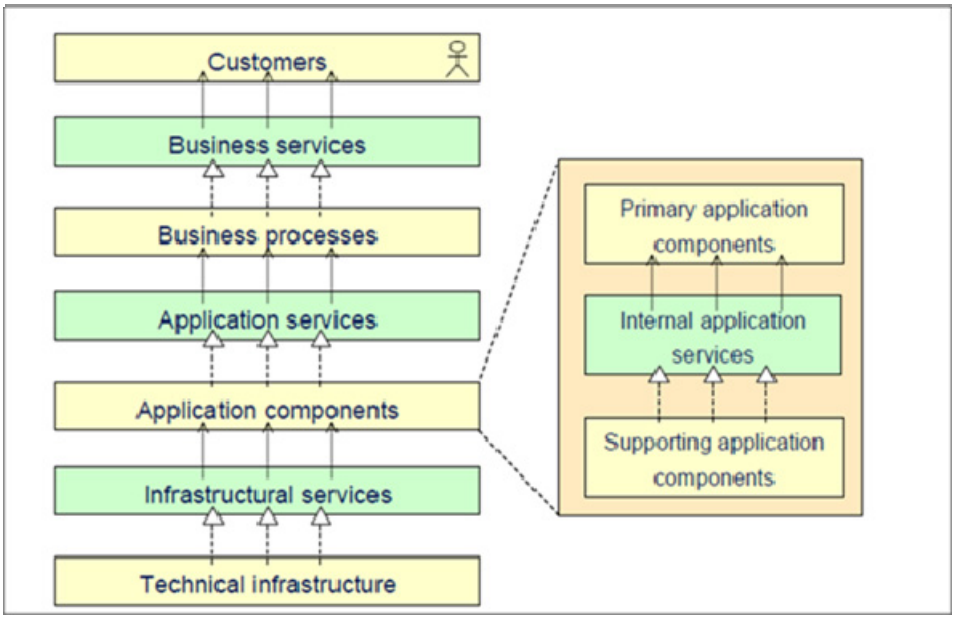

Figure 32: ArchiMate Generic Representation of Architectural Coherence Across Layers, including both Realization (dashed arrows) and Usage (solid arrows) of Services [22]

For ACORD users, the TOGAF and ArchiMate standards offer complementary and well-established models and methods. Together, they comprise an Architecture Development Method (ADM), two compatible content frameworks, an Enterprise Continuum for organizing architectures and solutions, technology reference models, unambiguous graphical modeling, and an Architecture Capability Framework. Therefore, insurance industry Enterprise Architects can use TOGAF and the ArchiMate language with the ACORD framework and standards to develop successful Enterprise Architectures.

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