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The Open Group Architecture Framework[1] (TOGAF) is the most widely referenced architecture framework currently in use by architecture teams*.

TOGAF and specifically the TOGAF Architecture Development Method (ADM) provide very good guidelines and best practices to architects that need to develop or implement architectures within organizations.

 Although the framework is more widely used within the Enterprise Architecture community, the fact is that the Open Group framework is designed to be used by any architecture community, including Solutions Architects, Security Architects, SOA Architects, and Business Architects.

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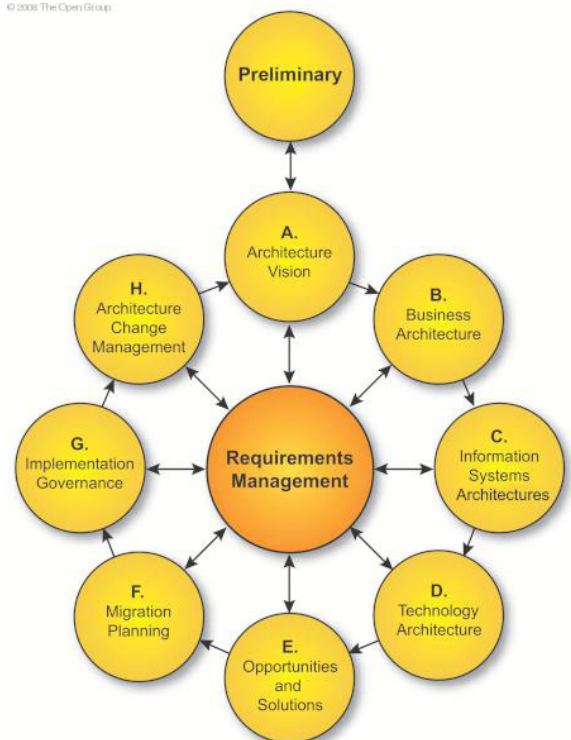
[1] TOGAF® is a registered trademark of The Open Group in the United States and other countries. All other trademarks are the property of their respective owners

In this white paper I want to highlight a few key points that I believe Solution Architects should know about the TOGAF ADM. The following key points are discussed in detail in subsequent sections:

#1 A Solution Architect is just another Architect

#2 Solution Architecture is part of an Enterprise Architecture Capability

#3 The TOGAF ADM is a Solution Architecture Development Method

#4 The ADM is designed to support Viewpoints

#5 The 4+1 Viewpoints and the ADM Phases

TIP: *Read my white paper "Why TOGAF 9 is still the de-facto standard", also available from the Orbus website, for the supporting argument I use to justify my claim.*

1. A Solution Architect is just another Architect

The essential skills of an architect

There is no such thing as a typical architect, as the architect's activities can range from creating a business case, solving the problems, estimating costs, producing the artefacts and documents to reviewing the work during implementation.

Essentially all architects all exhibit the same set of skills in applying their trade:

1. Architects **design,** they visualise, relate, select, synthesise and develop solutions.

2. Architects **draw** to explain their designs to stakeholders, from business executives showing simple diagrams with relationships between people, business activities and technology to complete detailed blueprints used by development, integration and IT operations teams.

3. Architects **write** specifications which, with the blueprint drawings, define the enterprise or solution. Architects also prepare written documentation of their projects, produce articles for professional magazines and do administrative paperwork.

4. Architects **speak** to clients, discuss designs and problems and alternative solutions and appear before executives. The ability of architects to communicate clearly and effectively is essential as they and are frequently referring, explaining, teaching and persuading.

5. Architects **analyse** business practices, technology trends, process throughput, etc. and must be able to prepare business cases and budgets.

6. Architects must **manage** their projects from initial ideas to the complete development/ design/ implementation. During the development or procurement phase, architects are responsible for the governance, including general review of the work in progress; interpretation of blueprints and specifications, resolving job difficulties and monitor the progress of the work.

Solution Architect

A solution architect require all the skills listed above, but is focused on the design and of new solutions, applications, or components based on the specified functional and non-functional business requirements as captured in the business model. The solution architect also works very closely with the business analyst (I will address the business analyst's interaction with TOGAF ADM in an upcoming white paper) and is responsible for the transformation, through the use of design patterns and reusable assets and design principles, of the business model into a detailed specification that is provided to the rest of the development team that will construct the system according to the specification.

2. Solution Architecture is part of the Enterprise Architecture Capability

Organizations normally differentiate between the levels of architecture in organizations and create different teams, reporting and governance structures for the different architecture disciplines, leaving solution, enterprise and domain architects all to create their own practices and capabilities in the organization.

I agree that it is sometimes required to create different organizational structures to accommodate the different architecture disciplines, but to realize the value of architecture in the organization, there should only be one logical Enterprise Architecture capability definition that include all the practices required.

I found the Model described in figure 2 and published by the Open Group's Adoption Strategies workgroup as a white paper with the title: World-Class Enterprise Architecture very insightful (https://www2.opengroup.org/ogsys/jsp/publications/PublicationDetails.jsp?catalogno=w102).

The model in figure 2, is a representation of the enterprise architecture capabilities that are required within the organization. In the diagram the general business capabilities are very similar to those defined in any other business function, while the foundational architecture capabilities are generic capabilities that exist in any architecture practice.

TIP: *The following is an extract from a Solution Architect job specification listed on a career website:*

1. *Designing of software and hardware solution architectures as per business, enterprise and project requirements for solution delivery implementation through properly defined and designed functional (business capabilities), and non-functional (security, business and technical operational, etc.) considerations.*

2. *Design each IT solution architecture for maximum resilience and availability, within cost constraints, in conjunction with the business and architecture team*

3. *Assist the enterprise architecture team with the definition and implementation of best practices and standards*

4. *Ensure solution architecture delivery adherence to enterprise architecture reference and solution standards*

5. *Definition of solution architecture standards when applicable*

6. *Definition of implementation standards, policies and procedures when applicable*

7. *Ensure solution delivery adherence to solution architectures i.e. use the right tooling, infrastructure, standards etc.*

8. *Ensure solution delivery adherence to defined principles, policies, technology, information and process standards.*

9. *Assist in the adoption of new technology capabilities for solution delivery.*

10. *Ensure that the architecture for a specific solution is developed and implemented as per original requirement and design*

11. *Evaluate deviations to the solution architecture against a defined Enterprise Architecture framework*

12. *Maintenance of IT architecture roadmaps*

13. *Development and maintenance of solution delivery roadmaps*

14. *Collaborate with solution delivery teams to achieve best possible solution implementations*

15. *Conduct research on emerging technologies in support of application and infrastructure development efforts, and recommend technologies that will increase cost effectiveness and business flexibility*

16. *Produce solution cost estimates*

17. *Implement the IT solution architectures as per project plan / roadmap*

18. *Provide technical skills and expertise to business and/or technical projects*

19. *Perform feasibility analysis / studies on potential IT solutions (custom applications, software packages, databases, network equipment, servers, storage, etc.)*

20. *Assist the capacity management function in the planning of Infrastructure and Network capacity for new or modified services*

21. *Assist with the evaluation of COTS systems, vendors and infrastructure*

General Business Capabilities Supporting an Architecture Practice

| Architecture Team Leadership & Direction | Performance Measurement | Team Management | Risk Management | Enterprise Engagement & Enrolment |

Architecture at the Strategy and Portfolio Management Level
- Architecture-Led Enterprise Strategy Development
- Architecture Support for Business and IT Strategy definition
- Architecture Road-Mapping

Architecture at the Program Level
- Architecture Supported Program Inception
- Architectural Governance and Issue Management

Architecture at the Project Level
- Architecture Budgeting & Estimation (Effort & Cost)
- Solution Architecture
- Project Assurance

Using Architecture to Manage Third Party Contractors
- Architecture Supported Procurement
- Architecture Supported Contractor Governance
- Contractor Collaboration and Integration Management

Foundational Architecture Capabilities

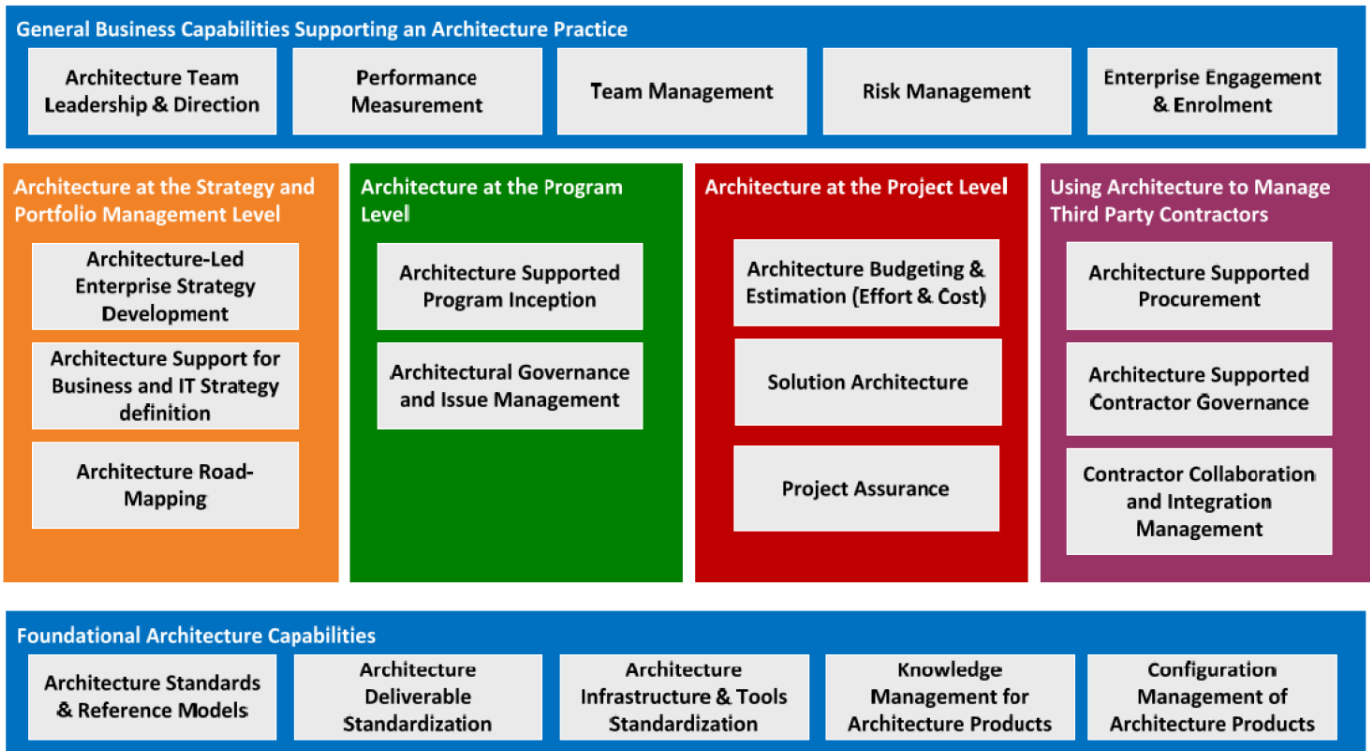| Architecture Standards & Reference Models | Architecture Deliverable Standardization | Architecture Infrastructure & Tools Standardization | Knowledge Management for Architecture Products | Configuration Management of Architecture Products |

Figure 2: World-Class Enterprise Architecture Capability Model

The World-Class Enterprise Architecture Capability Model also includes specific solution architecture capabilities required on a project level which uses architecture to articulate the high-level design for a project and govern its execution.

TIP:Download the World-Class Enterprise Architecture whitepaper from the publications section on the Open Group website, it provides a great insight into how to adapt TOGAF 9 for your organization. https://www2.opengroup.org/ogsys/jsp/publications/PublicationDetails.jsp?catalogno=w102

3. The TOGAF ADM as a Solution Architecture Development Method

According to TOGAF 9, an architecture is "a set of building blocks depicted in an architectural model, and a specification of how those building blocks are connected to meet the overall requirements of the business". The value of using the Architecture Development Method (ADM) to define the architecture building blocks is that the architecture will only contain the building blocks that are relevant to the business problem. The ADM is also used to select and define the solution building blocks, based on the architecture building blocks during Phases E & F of the ADM.
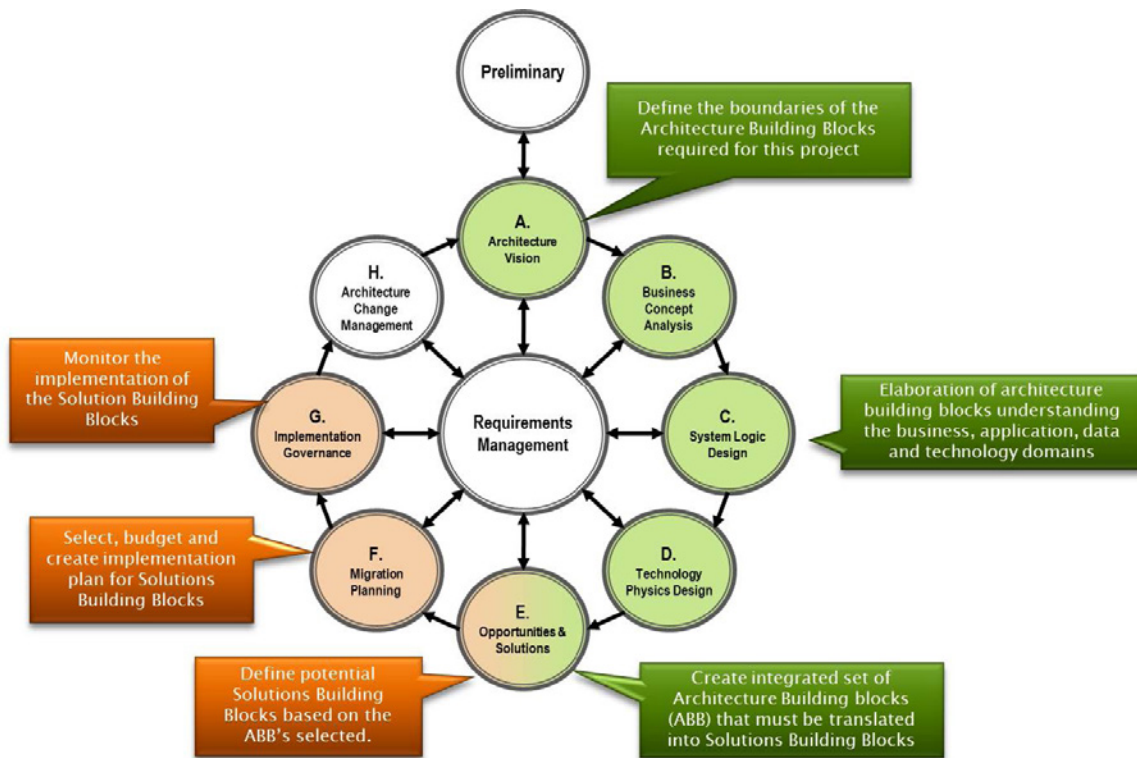
Figure 3: Using Building Blocks to define an Architecture Solution

TIP: *The TOGAF 9 ADM can be implemented by using different lifecycles, whilst still using the same phases. I found it very useful duplicating the table below in MS Excel and creating my own iteration map for projects that I am busy with. For more information see Chapter 19 in TOGAF 9: http://pubs.opengroup.org/architecture/togaf9-doc/arch/chap19.html#tag_19_04*

TOGAF Phase		Architecture Context	Architecture Definition			Transition Planning		Architecture Governance	
		Initial Iteration	Iteration 1	Iteration 2	Iteration n	Iteration 1	Iteration n	Iteration 1	Iteration n
Preliminary		Core	Informal	Informal	Informal				Light
Architecture Vision		Core	Informal	Informal	Informal	Informal	Informal		Light
Business Architecture	Baseline	Informal	Informal	Core	Core	Informal	Informal		Light
	Target	Informal	Core	Light	Core	Informal	Informal		Light
Application Architecture	Baseline	Informal	Informal	Core	Core	Informal	Informal		Light
	Target	Informal	Core	Light	Core	Informal	Informal		Light
Data Architecture	Baseline	Informal	Informal	Core	Core	Informal	Informal		Light
	Target	Informal	Core	Light	Core	Informal	Informal		Light
Technology Architecture	Baseline	Informal	Informal	Core	Core	Informal	Informal		Light
	Target	Informal	Core	Light	Core	Informal	Informal		Light
Opportunities and Solutions		Informal	Light	Light	Light	Core	Core	Informal	Informal
Migration Planning		Informal	Light	Light	Light	Core	Core	Informal	Informal
Implementation Governance						Informal	Informal	Core	Core
Change Management			Informal	Informal	Informal	Informal	Informal	Core	Core

■ Core: primary focus activity for the iteration

■ Light: secondary focus activity for the iteration

□ Informal: potential activity for the iteration, not formally mentioned in the method

Figure 4: ADM Lifecycle

4. The ADM is designed to support Viewpoints

Using viewpoints is crucial in developing solution architectures for the following reasons:

1. **Separation of concerns:** Creating solution architectures that are very complex and communicating different aspects to a wide range of stakeholders, while still being able to maintain integrity is a challenge. The TOGAF ADM Phases (from Phase A - E) are designed to address an interdependent set of concerns related to specific aspects of the system per phase. This is achieved by using viewpoints that enable stakeholders' related sets of concerns to be addressed through the use of standard viewpoints.

2. **Communication with stakeholder groups:** Viewpoints enable more effective stakeholder communication by grouping concerns of stakeholders and defining a notation appropriate to the stakeholder understanding and knowledge. The ADM Phases provide viewpoints for groups of stakeholders:

    a. **Phase A:** Project Sponsor, Executives, etc.

    b. **Phase B:** Business Managers, Operational staff, Line Functions, etc.

    c. **Phase C:** Application Managers, Developers, Data Warehouse professionals, etc.

    d. **Phase D:** Network managers, IT Operational staff, CTO, etc.

    e. **Phase E:** Project Managers, Product specialists

    f. **Phase F:** Financial Managers, Program Managers, etc

3. **Management of complexity:** The only way that architects can deal with complexity is to write all the aspects of the system down, and then analyse the different aspects of the systems separately.

The TOGAF ADM, in conjunction with a good architecture repository allows architects to analyse different aspects of the systems using the TOGAF ADM from Phase A –F, while the Requirements Management Phase is used to ensure all the different aspects are aligned and that an integrated set of requirements are created and implemented through the solution.

The TOGAF 9 standard includes a Content Framework that contains a set of viewpoints, but I personally think that Solutions Architects will find it easier to use the 4 + 1 set of viewpoints, in conjunction with the UML notation.

5. The 4+1 Viewpoints and the ADM

The 4 + 1 Viewpoints for describing software intensive systems was designed by Philippe Kruchten and is used as a common viewpoint library by solutions architects, especially architects using the UML notation and IBM Rational Unified Process.
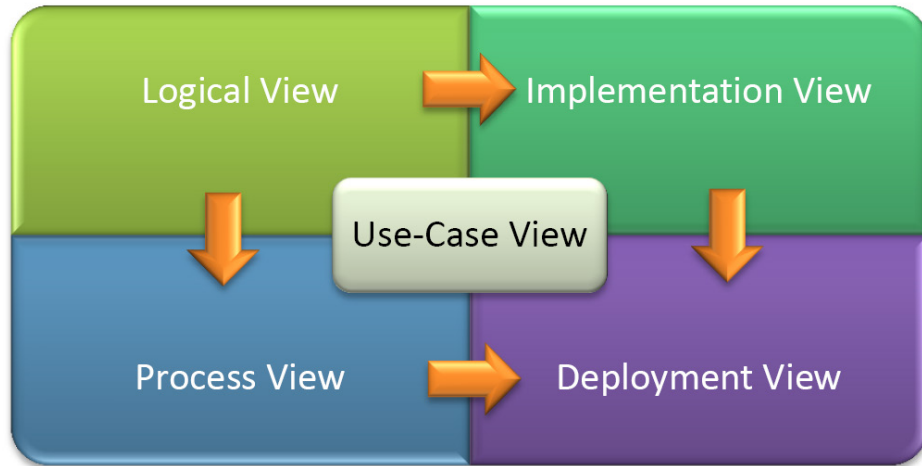

Figure 4: ADM Lifecycle

There are several different ways that the 4+1 viewpoints can be used with the TOGAF ADM. Figure 6 below shows how the TOGAF 9 ADM can be used as a solutions architecture development method, using UML 2.0 as a notation. The views created are then packaged as part of the Statement of Architecture Work in Phase A and within the Architecture Definition Document during the ADM Phases B-E.
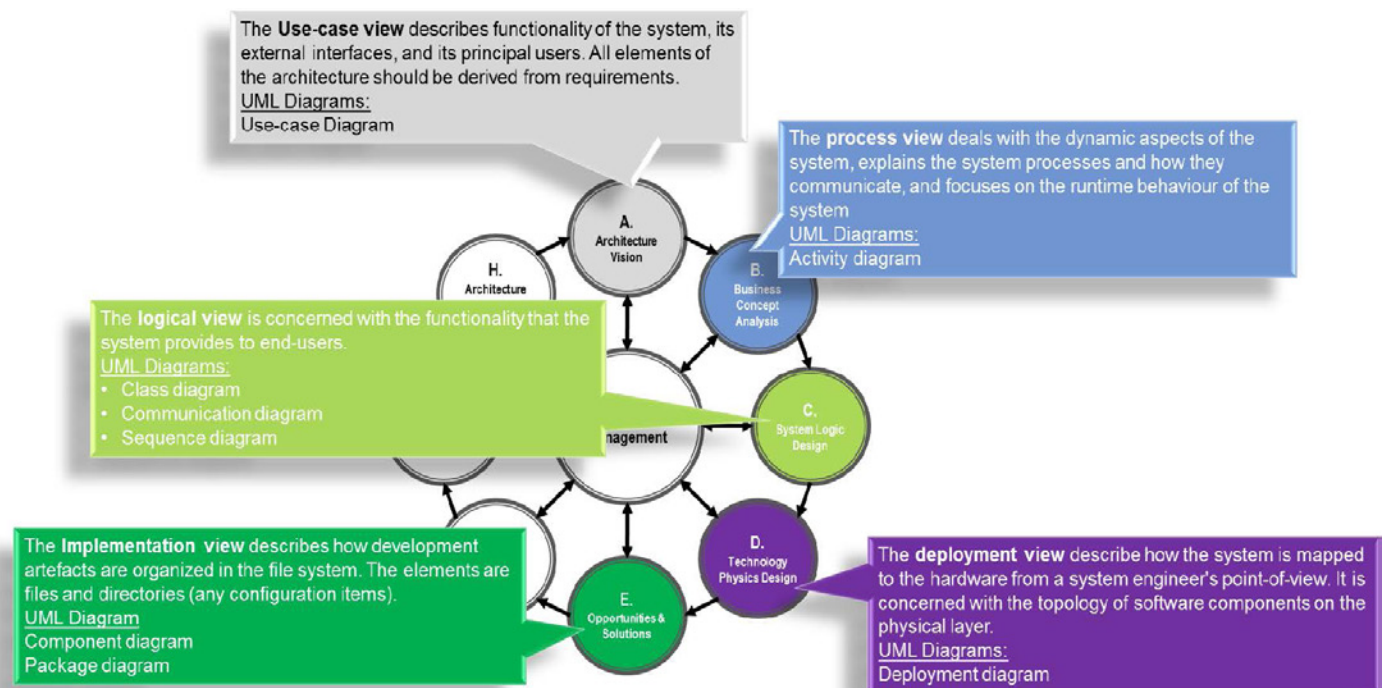
Figure 6: 4+1 Viewpoints mapped to TOGAF 9 for Solutions Architecture

It is also important to note that the ADM processes provide guidance for the architecture, risk, requirements and project management practices, but do not provide guidance on the rest of the practices required for solution development (including software development, testing and deployment).

TIP: *Integrating or aligning the ADM with a good solutions development framework is important and I normally use the OpenUP framework to compliment the TOGAF ADM. It is an Open Source framework and available from* http://epf.eclipse.org/. *As a quick reference it available to read online at* http://epf.eclipse.org/wikis/openup/.

Alternative Approach: In smaller or less formal environments practitioners tend to blend the business unit and solution architecture approaches. In those scenarios I would move the 4 + 1 viewpoints more towards Phase F and Phase G and rather use the TOGAF Content Framework Viewpoints, due to the fact that the stakeholders will have different expectations. (I will address this approach in an upcoming whitepaper)

Conclusion

In this white paper I highlighted 5 reasons why I believe that Solution Architects can (and should) use the TOGAF ADM to create architectures. Standardising on a single Architecture Development Method within an organization can provide the added benefit of standardised governance, better communication between architecture teams and integrated information management within the Architecture practice in the Organization.

Figure 7 below is a graphic from Chapter 20 of the TOGAF 9 standard that provides a visual representation of how different ADM cycles can be linked within an organization.
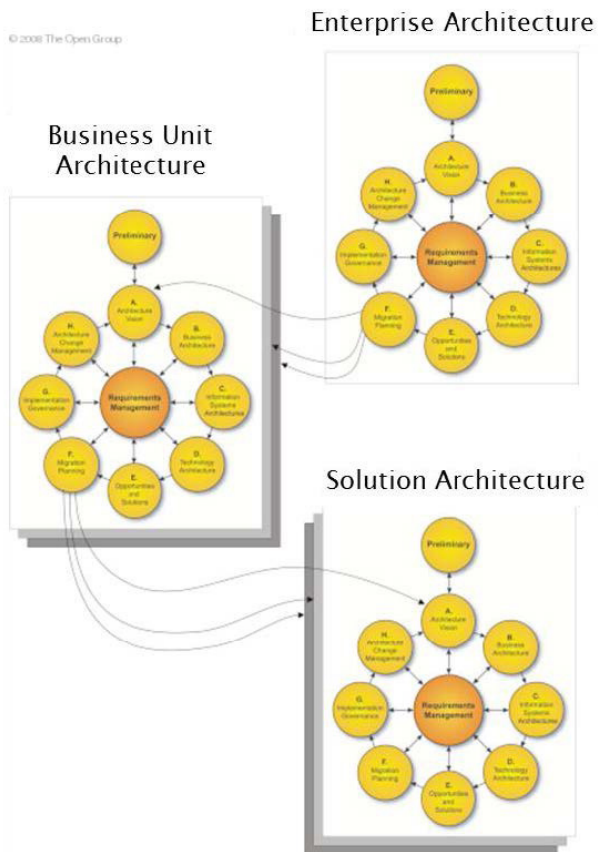
Figure 7: Levels of Architecture in an Organization

I addressed the generic Enterprise Architecture cycle in a previous white paper and I will write a follow-up white paper on the importance of the Business Unit Architecture and the role that the Business Analyst plays in creating the transition level architecture linked Enterprise and Solutions architectures.

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