

Enterprise Architecture Maturity Models

What are they?

Why do we need them?

Who has them?

Are they of value?

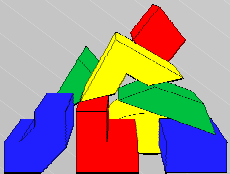
Dept of Commerce Guidelines

A TOGAF Enterprise Architecture Maturity Model

Way Forward

Conclusions and Recommendations

Contributions Welcome



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Enterprise Architecture Maturity Models

What are they?

- Carnegie Mellon developed Capability Maturity Models in early 1990s which have gained wide scale acceptance. Sponsored by DoD
- SEI – Software Engineering Institute have developed a number of generic models and appraisal methods e.g. .Architecture Trade-off Analysis method (ATAM) referred to in TOGAF 7 Phase C/TOGAF 8 Phase D
- Applied to IT Solutions particularly Software Solutions
 - Extended to cover:
 - Integration –CMMI and SCAMPI
 - People - IDEAL
 - Systems Engineering
- Adopted by large organisations e.g. US Dept of Commerce, US DoD, UK Government, and services organisations e.g. META, CSC to assess competencies
- Applied to IT Architecture
- Series of Template tools which assess :
 - the state of the IT Architecture process,
 - The IT Architecture,
 - Organization buy-in



Enterprise Architecture Maturity Models

Architecture Maturity Models

- The benefits of the CMM are well documented for Software and Systems Engineering
- Their Application to IT Architecture has been a recent development and is a growing trend
- All US Federal Agencies will be expected to provide Maturity Models and ratings as part of their IT investment management and audit requirements
- The CMM® is increasingly the standard by which outsourcers will be evaluated

- Increasingly IT Strategic Plans include strategies for improving architecture maturity model ratings which:
 - directly align with core business objectives
 - establish cross organisation and operating unit-wide IT goals
 - include measures to assess whether those goals are being achieved;
 - include the strategies and governance structure for developing and migrating to target architectures



Enterprise Architecture Maturity Models

US & UK Government Requirements

- **US directives : Thomas Pike Memorandum**
- **Industry demands Measures**
- **Main business Issues addressed**
 - **eCommerce Maturity**
 - **Process implementation & audit**
 - **Quality measurements**
 - **People Competencies**
 - **Investment Management**
 - **Portfolio Management**
- **Main Enterprise Architects issues**
 - **Multiplicity of Models**
 - **Measuring Business Benefits and Returns and relate to the Enterprise Architecture**



Enterprise Architecture Maturity Models

MEMORANDUM

- **FOR: Chief Information Officers**
- **FROM: Thomas N. Pyke, Jr. Chief Information Officer, Dept of Commerce**
- **SUBJECT: Strategic Information Technology (IT) Plans for FY 2003 through FY 2008**

- “Please update your Strategic IT Plan for FY 2003 through FY 2008. Preparing and updating this Plan is an important part of our structured process for applying IT to improve program service delivery, to use scarce resources most effectively, and to improve IT decision-making.
- Strategic IT planning should integrate with your processes for program planning, budget, financial management, and human resources management.
- To assist you in developing and improving your IT planning processes, we have developed **maturity models** for measuring progress in our IT Planning and Investment Review and **IT Architecture** processes, and provide the link to the IT Security Assessment Framework issued by the CIO Council to measure progress in our IT Security process.
- **These models are consistent with the Clinger-Cohen Act** and the Government Performance and Results Act. The Web addresses for the models are listed in the attachment, along with additional instructions about what your Strategic IT Plan should address.



Enterprise Architecture Maturity Models

US Department of Commerce

- The US DoC IT Architecture Capability Maturity Model consists of six levels and nine architecture characteristics.

- Level

- Focus

- Architecture Characteristics

The six levels are shown below:

- 0. None
- 1. Initial
- 2. Under Development
- 3. Defined
- 4. Managed
- 5. Measured.

The nine IT Architecture Characteristics are as follows:

- 1. Architecture Process
- 2. Architecture Development
- 3. Business Linkage
- 4. Senior Management Involvement
- 5. Operating Unit Participation
- 6. Architecture Communication
- 7. IT Security
- 8. Governance
- 9. IT Investment and Acquisition Strategy.



Enterprise Architecture Maturity Models

US Department of Commerce

- 0. None.
 - No IT Architecture Program
 - No IT Architecture to speak of.....

And that meansNo money.....



Enterprise Architecture Maturity Models

US Department of Commerce

■ 1. Initial:

■ Informal IT Architecture Process Underway

- (1) Processes are ad hoc and localized. Some IT Architecture processes are defined. There is no unified architecture process across technologies or business processes. Success depends on individual efforts.
- (2) IT Architecture processes, documentation and standards are established by a variety of ad hoc means and are localized or informal.
- (3) Minimal, or implicit linkage to business strategies or business drivers.
- (4) Limited management team awareness or involvement in the architecture process.
- (5) Limited. Operating Unit acceptance of the IT Architecture process.
- (6) The latest version of the Operating Unit's IT Architecture documentation is on the Web. Little communication exists about the IT Architecture process and possible process improvements.
- (7) IT Security considerations are ad hoc and localized.
- (8) No explicit governance of architectural standards.
- (9) Little or no involvement of strategic planning and acquisition personnel in enterprise architecture process. Little or no adherence to existing Standards



Enterprise Architecture Maturity Models

■ 2. Under Development

■ IT Architecture Process Is Under Development

- (1) Basic IT Architecture Process program is documented based on OMB Circular A - 130 and Department of Commerce IT Architecture Guidance. The architecture process has developed clear roles and responsibilities.
- (2) IT Vision, Principles, Business Linkages, Baseline, and Target Architecture are identified. Architecture standards exist, but not necessarily linked to Target Architecture. Technical Reference Model and Standards Profile framework established.
- (3) Explicit linkage to business strategies.
- (4) Management awareness of Architecture effort.
- (5) Responsibilities are assigned and work is underway.
- (6) The DoC and Operating Unit IT Architecture Web Pages are updated periodically and is used to document architecture deliverables.
- (7) IT Security Architecture has defined clear roles and responsibilities.
- (8) Governance of a few architectural standards and some adherence to existing Standards Profile.
- (9) Little or no formal governance of IT Investment and Acquisition Strategy. Operating Unit demonstrates some adherence to existing Standards Profile.



Enterprise Architecture Maturity Models

■ 3. Defined

■ Defined IT Architecture Including Detailed Written Procedures and Technical Reference Model

- (1) The architecture is well defined and communicated to IT staff and business management with Operating Unit IT responsibilities. The process is largely followed.
- (2) Gap Analysis and Migration Plan are completed. Fully developed Technical Reference Model and Standards Profile. IT goals and methods are identified.
- (3) IT Architecture is integrated with capital planning & investment control.
- (4) Senior-management team aware of and supportive of the enterprise-wide architecture process. Management actively supports architectural standards.
- (5) Most elements of Operating Unit show acceptance of or are actively participating in the IT Architecture process.
- (6) Architecture documents updated regularly on DoC IT Architecture Web Page.
- (7) IT Security Architecture Standards Profile is fully developed and is integrated with IT Architecture.
- (8) Explicit documented governance of majority IT investments.
- (9) IT acquisition strategy exists and includes compliance measures to IT Enterprise Architecture. Cost-benefits are considered in identifying projects.



Enterprise Architecture Maturity Models

■ 4. Managed

■ Managed and Measured IT Architecture Process

- (1) IT Architecture process is part of the culture. Quality metrics associated with the architecture process are captured.
- (2) IT Architecture documentation is updated on a regular cycle to reflect the updated IT Architecture. Business, Information, Application and Technical Architectures defined by appropriate de-jure and de-facto standards.
- (3) Capital planning and investment control are adjusted based on the feedback received and lessons learned from updated IT Architecture. Periodic reexamination of business drivers.
- (4) Senior-management team directly involved in the architecture review process.
- (5) The entire Operating Unit accepts and actively participates in the IT Architecture process.
- (6) Architecture documents are updated regularly, and frequently reviewed for latest architecture developments/standards.
- (7) Performance metrics associated with IT Security Architecture are captured.
- (8) Explicit governance of all IT investments. Formal processes for managing variances feed back into IT Architecture.
- (9) All planned IT acquisitions and purchases are guided and governed by the IT Architecture.



Enterprise Architecture Maturity Models

■ 5 Optimizing –

■ Continuous Improvement of IT Architecture Process

- (1) Concerted efforts to optimize and continuously improve architecture process.
- (2) A standards and waivers process are used to improve architecture development process improvements.
- (3) Architecture process metrics are used to optimize and drive business linkages. Business involved in the continuous process improvements of IT Architecture.
- (4) Senior management involvement in optimizing process improvements in Architecture development and governance.
- (5) Feedback on architecture process from all Operating Unit elements is used to drive architecture process improvements.
- (6) Architecture documents are used by every decision maker in the organization for every IT-related business decision.
- (7) Feedback from IT Security Architecture metrics are used to drive architecture process improvements.
- (8) Explicit governance of all IT investments. A standards and waivers process is used to improve governance-process improvements.
- (9) No unplanned IT investment or acquisition activity.



Enterprise Architecture Maturity Models TOGAF Version

- If we use the Dept of Commerce as a Guideline we have to ask

.....

- Are the levels of maturity appropriate?
- Is the focus right for Enterprise Architecture?
- Are the Enterprise Architecture Characteristics applicable?



Enterprise Architecture Maturity Models

US Department of Commerce

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- Level

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The six levels are shown below:

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- 1. Initial
- 2. Under Development
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The nine IT Architecture Characteristics are as follows:

- 1. Architecture Process
- 2. Architecture Development
- 3. Business Linkage
- 4. Senior Management Involvement
- 5. Operating Unit Participation
- 6. Architecture Communication
- 7. IT Security
- 8. Governance
- 9. IT Investment and Acquisition Strategy.



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Enterprise Architecture Maturity Models

Are the levels and Focus right for TOGAF Enterprise Architecture?

Level	Meaning	Architecture Status Description
0	None	No Enterprise Architecture
1	Initial	Informal Enterprise Architecture is underway
2	Under Development	Enterprise Architecture process is under development
3	Defined	Defined Enterprise Architecture Including Detailed Written Procedures and Technical Reference Model
4	Managed	Managed and Measured Enterprise Architecture Process
5	Optimised	Continuous Improvement of Enterprise Architecture Process



Enterprise Architecture Maturity Models

TOGAF Enterprise Architecture Characteristics

	TOGAF Enterprise Architecture Characteristics
1	Enterprise Architecture Framework Defined
2	Enterprise Architectures Development Method
3	Business and Requirements process
4	Stakeholder Participation
5	Enterprise Continuum
6	Enterprise Architecture Tools and Repository
7	Implementation Governance Operational
8	Architecture Projects
9	Architecture Change Management
10	Benefits Realisation



Enterprise Architecture Maturity Models

TOGAF Maturity Models

- 0. None:
 - No Enterprise Architecture in place
 1. No recognition for the need for Enterprise Architecture. Success depends on individual efforts.
 2. Enterprise Architecture Development methods ignored
 3. Business requirements specific to a problem
 4. Stakeholders limited to users of the solution.
 5. Product focussed
 6. Specifications delivered after the solution!
 7. Governance seen as bureaucracy.
 8. Architecture projects considered to be time wasting – lets get down to that code!!!!
 9. Legacy management is spiraling out of control
 10. Benefits not measured

TOGAF Enterprise Architecture Characteristics	
1	Enterprise Architecture Framework Defined
2	Enterprise Architectures Development Method
3	Business Scenarios and Requirements process
4	Stakeholder Participation
5	Enterprise Continuum
6	Enterprise Architecture Tools and Repository
7	Implementation Governance Operational
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9	Architecture Change Management
10	Benefits Realisation



Enterprise Architecture Maturity Models

TOGAF Maturity Models

■ 1. Initial:

■ Informal Enterprise Architecture Process Underway

1. Processes are ad hoc and localized. Some Enterprise Architecture processes are defined. There is no unified architecture process across technologies or business processes. Success depends on individual efforts.
2. Enterprise Architecture processes, documentation and standards are established by a variety of ad hoc means and are localized or informal.
3. Minimal, or implicit linkage to business strategies or business drivers.
4. Limited management team awareness or involvement in the architecture process.
5. Non-existent. Enterprise Architectures under development
6. The latest version of the Enterprise Architecture documentation is on the Web. Little communication exists about the Enterprise Architecture process and possible process improvements.
7. No explicit governance of architectural standards.
8. No Enterprise Architecture projects
9. Legacy architectures not subject to Architecture Change Management
10. No benefits achieved from the Enterprise Architecture Programme

TOGAF Enterprise Architecture Characteristics	
1	Enterprise Architecture Framework Defined
2	Enterprise Architectures Development Method
3	Business Scenarios and Requirements process
4	Stakeholder Participation
5	Enterprise Continuum
6	Enterprise Architecture Tools and Repository
7	Implementation Governance Operational
8	Architecture Projects
9	Architecture Change Management
10	Benefits Realisation



Enterprise Architecture Maturity Models

TOGAF Maturity Models

■ 2. Under Development :

■ Enterprise Architecture Process Is **Under Development**

1. Enterprise Vision, Principles, Business Linkages, Baseline, and Target Architecture are identified. Architecture standards exist, but not necessarily linked to Target Architecture. Technical Reference Model and Standards Profile framework established.
2. Basic Enterprise Architecture Process program is documented. The architecture process has developed clear roles and responsibilities.
3. Explicit linkage to business strategies.
4. Management awareness of Architecture effort.
5. Foundation architecture defined. Responsibilities are assigned and work is underway on common systems architectures.
6. The Enterprise Architecture Web Pages are updated periodically and is used to document architecture deliverables. Process modeling tools used.
7. Governance of a few architectural standards and some adherence to existing Standards Profile.
8. Architecture Projects linked with Project Management methodology
9. Little or no formal governance of existing Legacy architectures.
10. Potential Enterprise benefits realised.

TOGAF Enterprise Architecture Characteristics	
1	Enterprise Architecture Framework Defined
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3	Business Scenarios and Requirements process
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6	Enterprise Architecture Tools and Repository
7	Implementation Governance Operational
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Enterprise Architecture Maturity Models

TOGAF Maturity Models

■ 3. Defined:

- Defined **Enterprise** Architecture Including Detailed Written Procedures and Technical Reference Model
 1. The architecture is well defined and communicated to IT staff and business management. The process is largely followed.
 2. Gap Analysis and Migration Plan are completed. Fully developed Technical Reference Model and Standards Profile. IT goals and methods are identified.
 3. Enterprise Architecture is underwritten by the business operations
 4. Senior-management team aware of and supportive of the enterprise-wide architecture process. Management actively supports architectural standards.
 5. Architecture Building Blocks are translated into Solution Building Blocks and agreed by the business
 6. Architecture documents updated regularly on Enterprise Architecture Web Page.
 7. Explicit documented governance of majority Enterprise investments.
 8. Critical Architecture Projects under Programme and Project management control
 9. Architecture Governance commences. Architecture Board operational, Compliance reviews started.
 10. IT acquisition strategy exists and includes compliance measures to Enterprise Architecture. Cost-benefits are considered in identifying projects.

TOGAF Enterprise Architecture Characteristics	
1	Enterprise Architecture Framework Defined
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Enterprise Architecture Maturity Models

TOGAF Maturity Models

■ 4. Managed :

■ **Managed and Measured** Enterprise Architecture Process

1. Enterprise Architecture process is part of the culture. Quality metrics associated with the architecture process are captured.
2. Enterprise Architecture documentation is updated on a regular cycle to reflect the updated IT Architecture. Business, Information, Application & Data, Technology Architectures defined.
3. Capital planning and investment control are adjusted based on the feedback received and lessons learned from updated Enterprise Architecture. Periodic reexamination of business drivers.
4. Senior-management team directly involved in the architecture review process.
5. The Enterprise Continuum defined and re-use of architecture artifacts is best practice.
6. Enterprise repository set up and Architecture descriptions are updated regularly, and frequently reviewed for latest architecture developments/standards.
7. Explicit governance of all IT investments. Formal processes for managing variances feed back into Enterprise Architecture.
8. All Enterprise Architecture Projects prioritised and majority under Programme & Projects management
9. Asset Management of legacy architecture and related new initiatives managed through the change management process
10. Benefits of Enterprise Architecture realised for initial projects.

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Enterprise Architecture Maturity Models

TOGAF Maturity Models

■ 5 Optimizing –

■ Continuous Improvement of Enterprise Architecture Process

1. Enterprise Architecture principles and process optimize and continuously improved
2. Fully operational ADM with continuous improvement activities
3. Architecture process metrics are used to optimize and drive business linkages. Business involved in the continuous process improvements of Enterprise Architecture.
4. Senior management involvement in optimizing process improvements in Architecture development and governance.
5. Enterprise Continuum fully operational with compatible Industry Enterprise Products & Solutions.
6. Architecture documents and descriptions are used by every decision maker in the organization for every IT-related business decision.
7. Explicit governance of all IT investments. Continuous Improvement of governance-process and related Service delivery.
8. No unplanned IT investment or acquisition activity. Architecture projects integrated with Ser
9. Portfolio Management of Architecture projects and Service delivery
10. Investment Management & Value assessment of Enterprise Architecture built into the P&L

TOGAF Enterprise Architecture Characteristics	
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Enterprise Architecture Maturity Models

Way Forward



■ Capability Maturity Models Integration (CMMI)

- Multiplicity of Maturity Models
 - How do you integrate?
 - SEI have developed a Framework called CMMI to manage complexity
 - CMMI is being adopted worldwide, including North America, Europe, India, Australia, Asia Pacific, and the Far East. This kind of response from the software community has substantiated the SEI's commitment to the CMMI models and SCAMPISM.
 - The SEI continues to advocate the adoption of CMMI models as the best process improvement models available for product and service development and maintenance.
 - These models build on and extend the best practices of the Capability Maturity Model for Software (SW-CMM[®]), the Systems Engineering Capability Model (SECM), and the Integrated Product Development Capability Maturity Model (IPD-CMM).
- **CMMI is widely used as an industry standard and is mature enough to use for Enterprise Architecture assessments**
- **Sponsored by the DoD through CM and SEI**
- **The CMMI is becoming an essential Framework**
 - **Also the SEI tools e.g. SCAMPI, IDEAL are “freely” available**



Enterprise Architecture Maturity Models Conclusions & Recommendations

- Architecture Forum Approach
 - Use the Dept of Commerce template as a role model
 - Produce a TOGAF specific CMMI template
- TOGAF “8.1” will include example of Architecture and Capability Maturity Modelling
- TOGAF “9” will have its own Architecture and Capability Maturity Modelling
- Strategy
 - Develop SEI Relationship
 - Include formal outputs in the Enterprise Architecture Development Method
 - Contributions from the Architecture Forum Community and our Friends



Enterprise Architecture Maturity Models Contributions Welcome

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Feedback to : judith@architecting-the-enterprise.com