

White Paper
CMII-820C

Enterprise Architecture Methodologies and the CMII Model



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CMII Research Institute

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Purpose of This White Paper

Enterprise architecture (EA) was introduced to improve the return on investment in information technology (IT). This white paper will show that EA is an IT attempt to solve a CM problem. It will describe where the EA methodologies are deficient and how CMII can fill in the gaps.

OUTLINE

- **Enterprise Architecture and Its History**
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Enterprise Architecture and its History

The *Clinger-Cohen (Information Technology Management Reform) Act* was passed in 1996 to resolve accelerating investments in information technology (IT) and declining benefits. It mandated that all federal agencies take steps to improve the effectiveness of their IT investments. The Office of Management and Budget (OMB) issued Circular A-130 in 2000 which requires all agencies in the Executive Branch to establish and maintain an Enterprise Architecture per the OMB guidelines.

An enterprise architecture (EA) is the explicit description and documentation of the current and desired relationships among business and management processes and information technology. It describes the "current architecture" and "target architecture" to include the rules and standards to optimize and maintain the environment which the agency wishes to create and maintain by managing its IT portfolio. The EA must also provide a strategy that will enable the agency to support its current state and also act as the roadmap for transition to its target environment. These transition processes will include an agency's capital planning and investment control processes - - - .

Office of Management and Budget Circular A-130 Transmittal Memorandum No. 4, 2000

Enterprise architecture evolution timeline:

1987: *A Framework for Information Systems Architecture* by Zachman.

1994: *Technical Architecture Framework for Information Management (TAFIM)* by the Department of Defense.

1996: The Clinger-Cohen bill passed by Congress.

1998: TAFIM was retired but revived by the Open Group and is now The Open Group Architecture Framework (TOGAF).

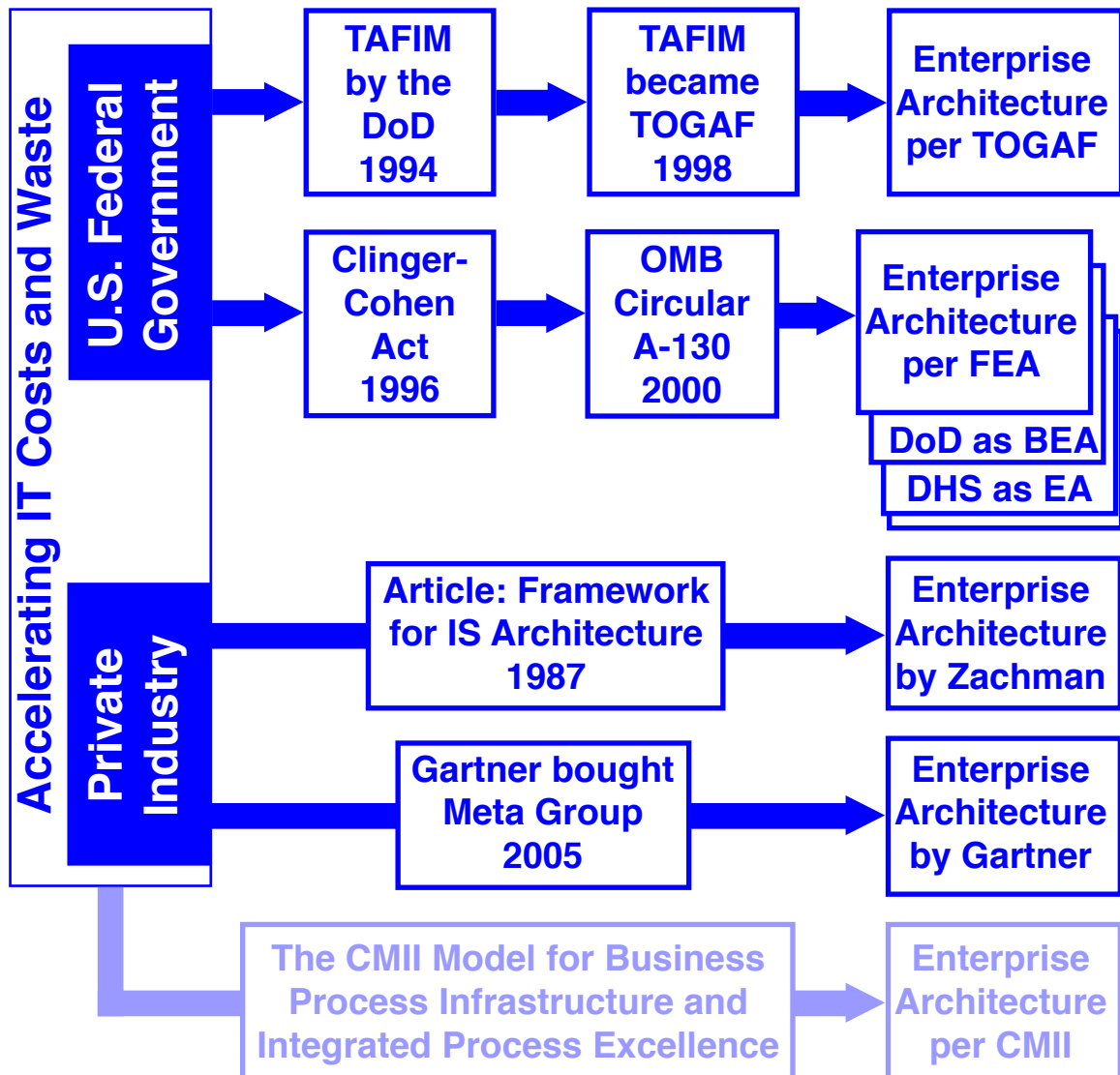
1999: A CIO Council with CIOs from each government agency released the Federal Enterprise Architecture Framework (FEAF).

2002: The Office of Management and Budget (OMB) took over and re-named FEAF as the Federal Enterprise Architecture (FEA).

2005: Gartner purchased the Meta Group and became the dominant EA provider in the private (commercial enterprise) sector.

Title 48 within the U.S. Code of Federal Regulations contains the acquisition regulations. Chapter 1 provides a standardized version. Subsequent chapters are reserved for each agency to tailor the requirements to suit their own needs. The DoD has created its own version of the Federal Enterprise Architecture and renamed it *Business Enterprise Architecture*. The Department of Homeland Security (DHS) has created its own version. Other rule-making agencies may do the same.

The EA history is replayed in a graphic format and the CMII model is added as another EA methodology, as shown below. CMII is not well known in the IT-oriented EA circles even though it has an enterprise-wide footprint because it evolved in the configuration management domain.



Top Four EA Methodologies and Ratings

These ratings are from *A Comparison of the Top Four Enterprise-Architecture Methodologies* by Robert Sessions, CTO of ObjectWatch, Inc., as published in Microsoft's MSDN Magazine in 2007.

Many EA methodologies have come and gone in the last 20 years and the following four now dominate the field:

- *Zachman Framework for Enterprise Architecture*
- *The Open Group Architectural Framework (TOGAF)*
- *Federal Enterprise Architecture (FEA)*
- *Gartner Methodology*

Mr. Sessions summarizes the similarities and differences in these four methodologies via his rating scale — which is relatively simple, easy to understand and suitable for the purposes of this paper.

These four methodologies are very different in their approaches. They are compared on the basis of 12 criteria and by using the following ratings:

- 1 — does a very poor job*
- 2 — does an inadequate job*
- 3 — does an acceptable job*
- 4 — does a very good job*

Criteria 1: Taxonomy completeness — how well the various architectural artifacts are classified. (Zachman - 4, FEA - 2, TOGAF - 2, Gartner - 1)

Criteria 2: Process completeness — how well the methodology guides you through the process. (TOGAF - 4, Gartner - 3, FEA - 2, Zachman - 1)

Criteria 3: Reference model guidance — how useful the methodology is in helping you build a relevant set of reference models. (FEA - 4, TOGAF - 3, Gartner - 1, Zachman - 1)

Criteria 4: Practice guidance — how much the methodology helps you develop a culture in which EA is valued and used. (Gartner - 4, FEA - 2, TOGAF - 2 and Zachman - 1)

Criteria 5: Maturity model — how much guidance the methodology gives you in assessing the maturity of your organization using EA. (FEA - 3, Gartner - 2, TOGAF - 1, Zachman - 1)

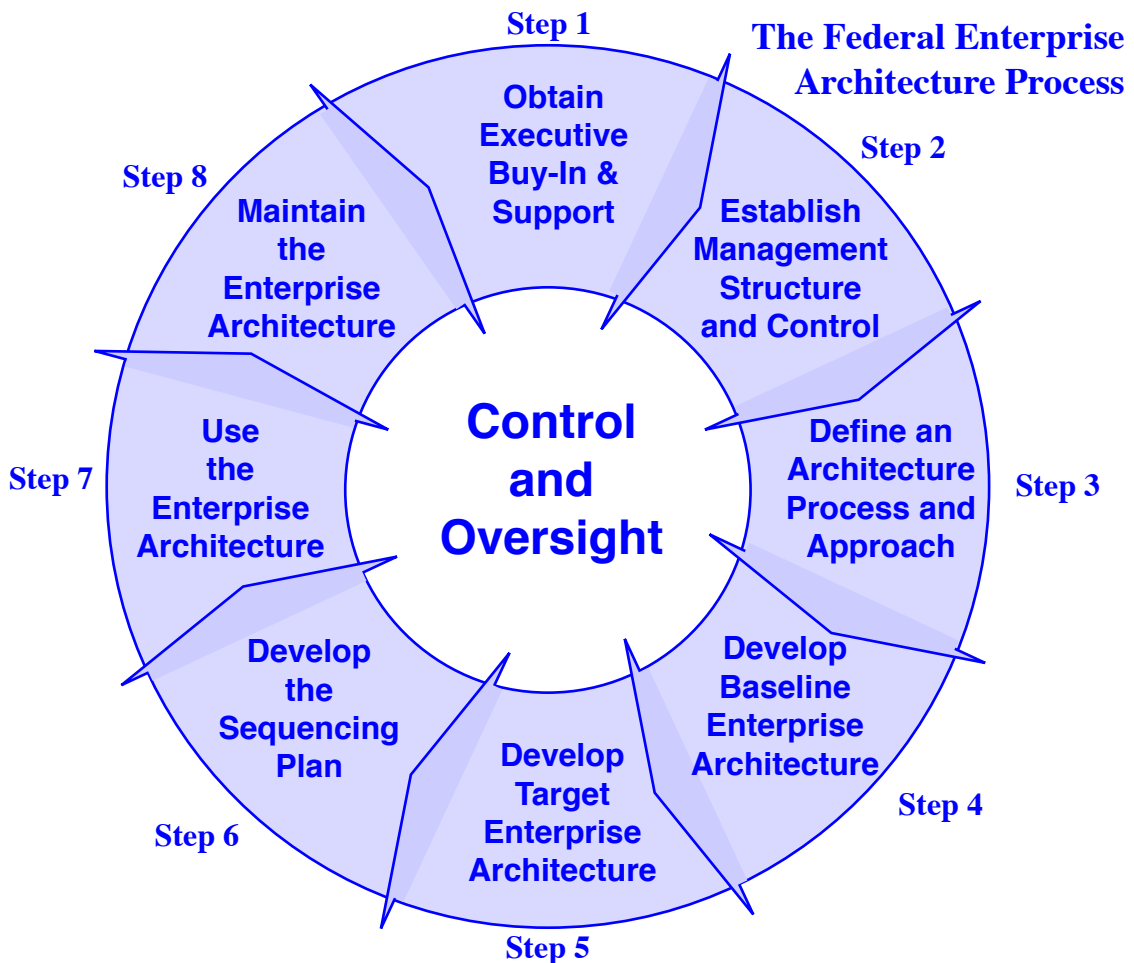
- Criteria 6:** *Business focus — whether the methodology will focus on using technology to drive business value via reduced expenses and/or increased income. (Gartner - 4, TOGAF - 2, FEA - 1, Zachman - 1)*
- Criteria 7:** *Governance guidance — how helpful the methodology will be in creating an effective governance model for EA. (FEA - 4, Gartner - 3, TOGAF - 2, Zachman - 1)*
- Criteria 8:** *Partitioning guidance — how well the methodology will guide you into effective autonomous partitions of the enterprise. (FEA - 4, Gartner - 3, TOGAF - 2, Zachman - 1)*
- Criteria 9:** *Prescriptive catalog — how well the methodology helps you set up a catalog of architectural assets that can be reused. (FEA - 4, TOGAF and Gartner - 2, Zachman - 1)*
- Criteria 10:** *Vendor neutrality — ability to avoid getting locked in with one consulting organization by adopting this methodology. (TOGAF - 4, FEA - 3, Zachman - 2, Gartner - 1)*
- Criteria 11:** *Information availability — the amount and quality of inexpensive information about this methodology. (TOGAF - 4, FEA - 2, Zachman - 2, Gartner - 1)*
- Criteria 12:** *Time to value — time before you will be using this methodology to deliver business value. (Gartner - 4, TOGAF - 3, FEA - 1, Zachman - 1)*

CRITERIA	METHODOLOGY AND RATINGS			
	Zachman	TOGAF	FEA	Gartner
Taxonomy completeness	4	2	2	1
Process completeness	1	4	2	3
Reference-model guidance	1	3	4	1
Practice guidance	1	2	2	4
Maturity model	1	1	3	2
Business focus	1	2	1	4
Governance guidance	1	2	3	3
Partitioning guidance	1	2	4	3
Prescriptive catalog	1	2	4	2
Vendor neutrality	2	4	3	1
Information availability	2	4	2	1
Time to value	1	3	1	4

by Roger Sessions, ObjectWatch, Comparison of the Top Four Enterprise-Architecture Methodologies, Microsoft MSDN Magazine, 2010

Federal EA Process and Reference Models

The Federal process for creating, using and maintaining the EA involves 8-steps as shown below. An assigned architecture team (step 2) defines an approach and process (step 3) to build the baseline EA (step 4) and the target EA (step 5). The architecture team then develops the sequencing plan (step 6). (It is noted that the existing baseline is established before the target baseline, or destination, is defined).



A Practical Guide to Federal Enterprise Architecture, Chief Information Officer Council, 2001

The FEA process is focused on creating a segment architecture for a subset of the overall enterprise. In the FEA's case, the enterprise is the Federal Government and the subset is a government agency. Federal agencies are rated on their overall maturity levels in (1) architectural completeness, (2) architectural use and (3) architectural results.

by Roger Sessions, ObjectWatch, Comparison of the Top Four Enterprise-Architecture Methodologies, Microsoft MSDN Magazine, 2010

The matrix shown below represents the EA framework as tailored for the U.S. Coast Guard within the Department of Homeland Security. An audit of the U.S. Coast Guard's EA implementation progress was completed in July, 2009 by the DHS Office of Inspector General and the results are reported in OIG-09-03.

This matrix also provides good insight as to why a Federal agency might find that it needs to be tailored — especially the business column.

U.S. Coast Guard		EA Framework Perspectives (in descending order) →					
		Performance	Business	Information	Service	Technology	Security
(in descending order) ↓	Profiles Strategic Level Information	Performance Profile Core Missions	Business Profile	Information Profile	System Profile		
		Performance Profile C4&IT	Value Chain Alignment	Data Profile	Services Profile	IT Products and Standards Profile	Security Profile
		Balance Scorecard C4&IT	USCG Concept of Operations	GIS Profile	External Services Profile	C4 Products Profile	
			USCG Snapshot		Command Center Profile	Network Profile	
			Major Programs Profile			Frequency Spectrum Profile	
			Sector Commands Profile		C4&IT Transition Portfolio Profile		
			USCG Cutters and Aircraft Profile		C4&IT Transition Timeline Profile		
Models Data Relationships	United Performance Logic Module	Business Models	Data Models	System Models	Network Models		
		Organizational Charts		Application to Bus. Activities Matrix			
Inventories Detailed Data Data Descriptions	Performance Inventory	Business Inventory	Information Inventory	Systems Inventory			
	USCG Posture Statement	Strategy for Safety, Security & Stewardship	Data Inventory	Services Inventory	IT Products and Standards Inventory	Security Inventory	
		Functional Statements	GIS Inventory	External Services Inventory	CA Products Inventory		
		Activity Dictionary	Information Exchange Matrix		Infrastructure Inventory		
		USCG Universal Task Library	Information Dictionary		Frequency Spectrum Matrix		
		USCG Operational Nodes		C4 and IT Transition Inventory			

C4&IT: Computers and IT

OIG-09-92 Review of U.S. Coast Guard Enterprise Architecture Implementation Process, July 2009

It is noted that the U.S. Coast Guard Logistics initiated a parallel program in 2005 under the Coast Guard modernization effort with a goal of achieving a common business model supported by a common logistics IT architecture. The common business model is comprised of four cornerstones: (1) configuration management, (2) total asset visibility, (3) a bi-level support program and (4) products lines to serve as a single point of contact for enterprise asset support.

The Four Cornerstones of Coast Guard Support by VADM Clifford I. Pearson, EE&L Quarterly, Spring 2009

Enterprise Architect Certification Options

The following is a list of organizations and the certifications that they offer in the enterprise architecture domain.

SOWELLEAC

Enterprise Architecture Certification and Customization

Basic certification program — four modules (10 days)

Black Belt EA Practitioner Certification (6 days + homework)

www.sowelleac.com

EACOE (Enterprise Architecture Center of Excellence)

Certification to Each of Four Levels of EA Expertise

- ***Enterprise Architect (Classroom + experience + recognition)***
- ***Senior Enterprise Architect (Added depth in each category)***
- ***Distinguished Enterprise Architect (Added depth)***
- ***Enterprise Architect Fellow (Added depth)***

www.eacoe.org

THE OPEN GROUP

Certification Options and/or Tracks

- ***TOGAF 8 Certification (Pass 101 question test)***
- ***TOGAF 9 Foundation (Pass 40 question test)***
- ***TOGAF 9 Certification (Pass 2nd 40 question test)***
- ***Bridge from TOGAF 8 to 9 (Pass 60 question test)***

www.opengroup.org/togaf9/cert

FEAC (Federated Enterprise Architecture Certification) INSTITUTE

Certifications and Certificates

- ***Commercial/FEAF Certification (5 courses earn 20 CEUs)***
- ***DoD EA Certification (5 courses earn 20 CEUs)***
- ***EA Green Belt and Black Belt Certificates***

www.feacinstitute.org/

INSTITUTE FOR ENTERPRISE ARCHITECTURE DEVELOPMENTS

Certifications

- ***Federal EA Certification***
- ***DoD EA Certification***
- ***Commercial EA Certification***
 - ***TOGAF 9***
 - ***Zachman***

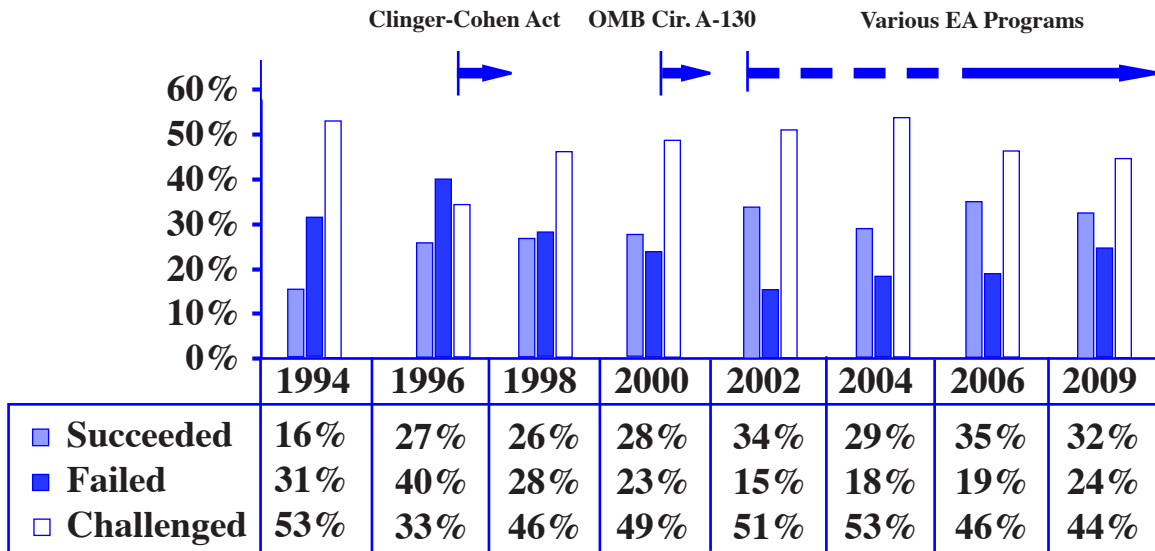
Certification by Skill Category

- ***Enterprise Architect***
- ***Business Architect***
- ***System Architect***
- ***IT Architect***
- ***Software Architect***
- ***System Designer***
- ***Component Designer***

www.feacinstitute.org/

IT Projects and Success Ratios: 1994 - 2009

The Standish Group has been monitoring the success rates of software development projects in the U.S. since 1994. As shown, the success ratio remains at 35% or below. The statistics indicate that the EA movement has yet to improve overall performance significantly.



The Standish Group, "Chaos Database"

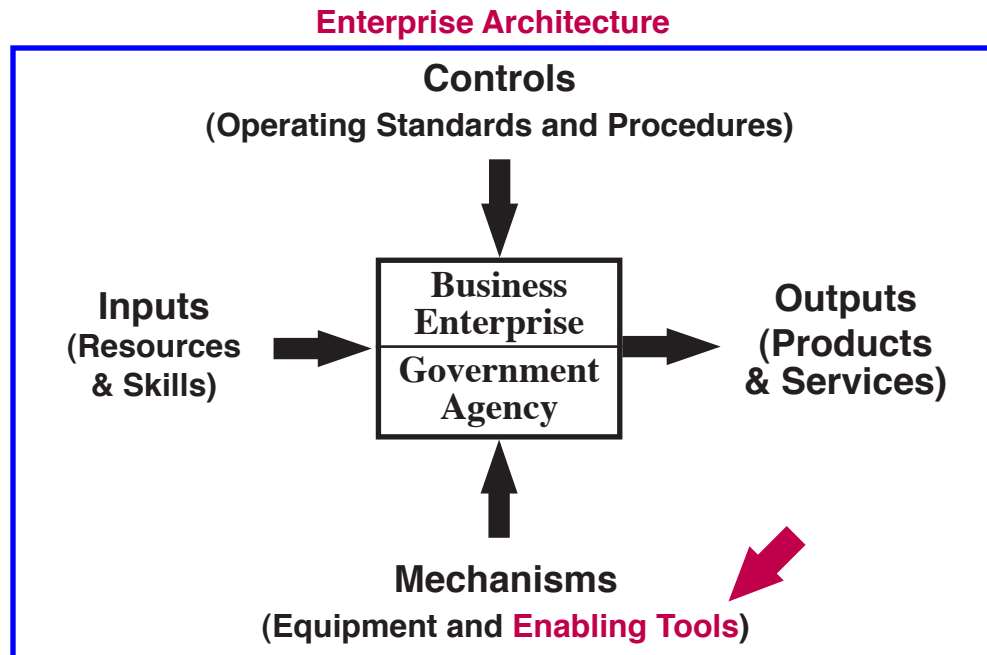
With IT budgets totaling \$250 to \$300 billion per year, the amount of waste is obviously huge. Survey participants (CIOs and IT specialists) offered the following opinions as to why their projects succeeded or failed.

SUCCESS CRITERIA	%	FAILURES WERE DUE TO	%
1. User involvement	16	1. Lack of user input	13
2. Executive support	14	2. Incomplete requirements	12
3. Clearly stated requirements	13	3. Changing requirements	12
4. Proper planning	10	4. Lack of executive support	8
5. Realistic expectations	8	5. Technology incompetence	7
6. Smaller project milestones	8	6. Lack of resources	6
7. Competent staff	7	7. Unrealistic expectations	6
8. Ownership	5	8. Unclear objectives	5
9. Clear vision and objectives	3	9. Unrealistic time frames	4
10. Hard-working, focused staff	2	10. New technology	4
Other	14	Other	23

www.projectsmart.co.uk/docs/chaos-report

Enterprise Architecture Goals Simplified

The Clinger-Cohen Act was initiated because costs of information technology investments were increasing faster than the benefits derived from those investments. The output value-to-input cost ratio was decreasing when it was supposed to be increasing. Waste was a big concern.



To ensure that new IT tools will be effective and waste will be avoided, it is necessary to understand all of the other inputs and outputs. The EA serves to ensure that all agencies use a similar methodology for developing an understanding of their own business model, its needs and how better tools might help satisfy those needs. A parallel goal is to standardize IT applications across the models when appropriate.

For the purposes of EA and this white paper, product development costs are separate from process improvement costs. Software development costs associated with products are separate from the IT expenditures associated with improving business information systems.

The focus of enterprise architecture and this white paper are on IT expenditures associated with improving information systems.

Automation Is Best Achieved in Two Stages

With CMII, the implementation of a new information system, or upgrades to an existing system, are accomplished in two stages. Stage I serves to establish the appropriate foundation upon which automation can be successful. Actual automation is accomplished in Stage II. (Constructing an EA is supposed to provide benefits similar to Stage 1).

To complete Stage I is to complete steps 1 through 5 as shown below. A strategic business plan provides the design basis for what the organization does and how it does what it does. It identifies the core business processes and their owners. The core business process owners create the operating standards and procedures for how work is to be performed and how information is to be managed. The process owners also assign creator and user teams to manage and execute each work flow.

The creator/user teams are responsible for achieving consistent performance and continuous improvement within each work flow. This includes ensuring that requirements are clear, concise and valid and that records and data are accurate.

Once completing steps (1) through (5), an upgrade to existing IT systems is ensured of being successful. It should never be an outright failure. In Standish Group terms, it should not even be challenged.

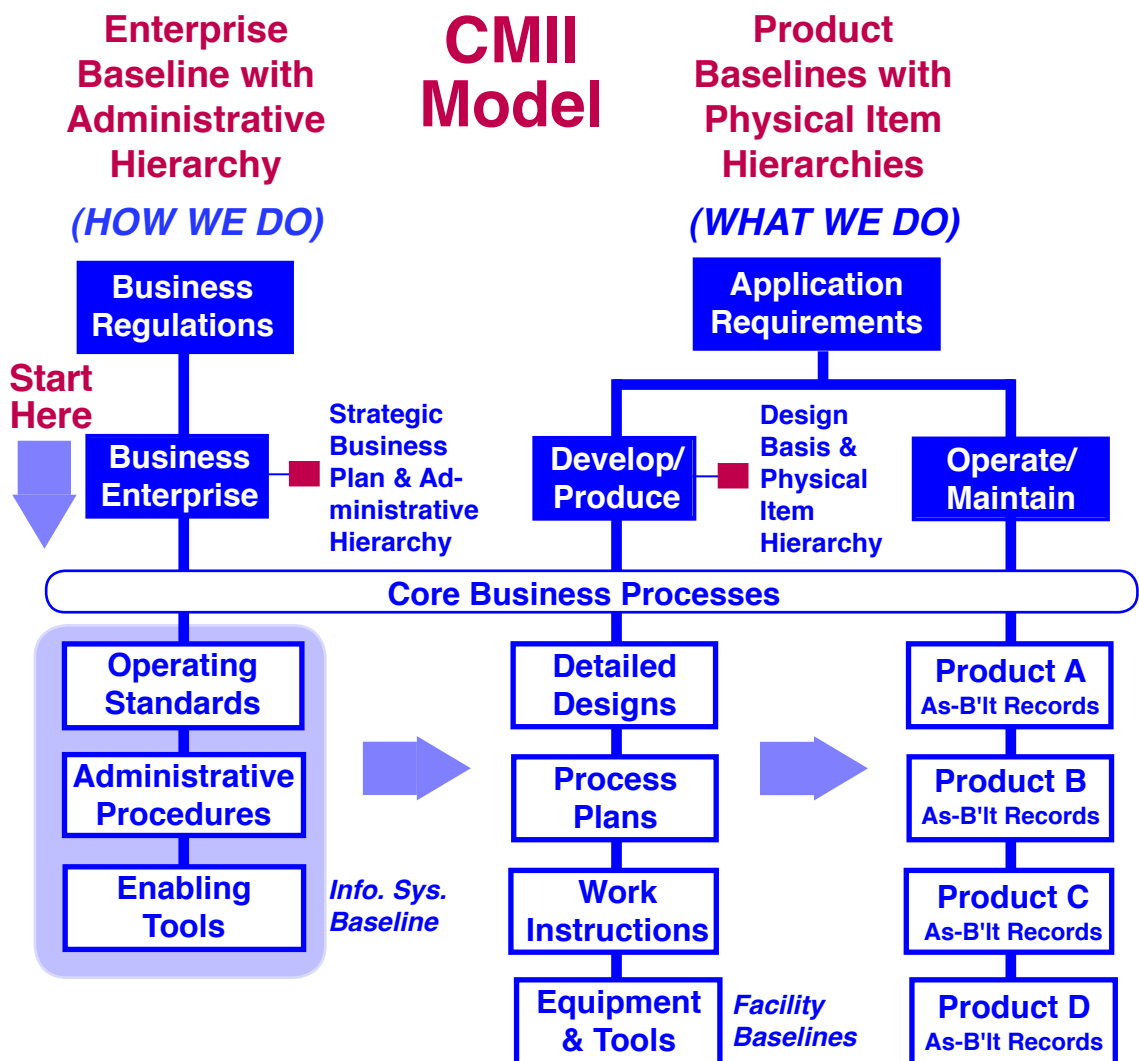


The CMII Process Model

The CMII process model is equivalent to the "target" enterprise architecture. It is the destination. Once the destination is defined, existing practices and enabling tools are assessed relative to the destination and a transition plan is developed accordingly.

With CMII, the planning and implementation cycles are greatly shortened. The planning cycle includes creating a tailored version of the CMII model, which is like creating a tailored version of the FEA.

The FEA, however, is very high-level. The CMII model goes much deeper into the detailed methodologies where the highest degree of standardization resides and where enabling tools are most important.



CMII versus EA: Strengths and Weaknesses

Any process that can accommodate change and keep requirements clear, concise and valid, and also keep records and data accurate, has universal application. Any business enterprise or government agency that cannot do both, has no choice but to operate in the corrective action mode. The root causes are the same in every case. The CMII model was designed to eliminate those root causes.

The CMII model is all about how work is performed and how information is managed. It is about ensuring that the right work is being done and that work is being done right. All work is requirements-driven. All work is authorized and controlled by forms. The work results must conform to the requirements in every case.

When requirements are clear, concise and valid, conforming results are the norm. When requirements are not clear, concise and valid, the results are unpredictable. Keeping requirements clear, concise and valid is a challenge because they exist in a state of change. The only constant is change. The best enterprise architecture is that which can best manage change — which is where the CMII model excels.

With CMII, it is called business process infrastructure, not enterprise architecture. The business process infrastructure, per the CMII model, is designed to accommodate change and keep requirements clear, concise and valid. Properly structured baselines closely coupled with a closed-loop change process are cornerstones of this infrastructure.

Unfortunately, such provisions do not exist in any of the other EA methodologies. Automation, alone, will not propel any organization out of the corrective action mode. Establishing an enterprise architecture per any of the other methodologies will not do so either. Those methodologies do not get down to the root causes of corrective action and waste.

The Logistics branch of the U.S. Coast Guard apparently recognized this, based on their decision (page 8) to initiate a parallel modernization program wherein one of the four cornerstones is configuration management. They have the right idea but they need to ensure that they adopt the methodology that can also accommodate change.

EA Rating Criteria Applied to the CMII Model

Taxonomy completeness (CMII - 4)

CMII goes into great detail at classifying artifacts which include physical items, documents, business processes, work flows, personnel and so on.

Process completeness (CMII - 4)

CMII is all about process — such as five levels of process evolution, nine step development process, closed-loop change process, and so on.

Reference-model guidance (CMII - 4)

CMII includes extensive reference models and each is fully documented and illustrated — such as baseline models, change process model, metadata models, and so on.

Practice guidance (CMII - 4)

Those who complete the prerequisite CMII training are fully converted to the CMII mindset and fully endorse the CMII principles.

Maturity model (CMII - 4)

One measure is the degree to which change effectivities are being achieved. Another is the ratio of resources being spent on intervention.

Business focus (CMII - 4)

CMII provides the how-to for becoming lean and agile and for transitioning from the corrective action mode to the continuous improvement mode.

Governance guidance (CMII - 4)

Process oversight and internal audit are combined into a core business process and built into the CMII model.

Partitioning guidance (CMII - 4)

Subdividing the organization into its core business processes and creating creator/user teams to manage each work flow are important parts of the CMII methodology.

Prescriptive catalog (CMII - 4)

The CMII model uses naming conventions to identify similarities and differences between various artifacts for the purpose of optimizing their reuse.

Vendor neutrality (CMII - 4)

Several enabling software tools have been certified to be CMII-compliant. Other than assigning a compliance rating, one is not promoted over the others.

Information availability (CMII - 4)

All important information is maintained in baselines and backed up with metadata. Any desired information can be accessed by simply clicking on it.

Time to value (CMII - 4)

This is where CMII excels — in both product development and process improvement.

Conclusions

The objectives of the Clinger-Cohen Act are sound but the best known enterprise architecture methodologies, that have been developed to achieve those objectives, are missing essential ingredients. Without those ingredients, business enterprises and government agencies alike, will continue to operate in the corrective action mode and experience excessive waste. The overall objectives are not likely to be achieved.

Fortunately, the missing ingredients are where the CMII model excels. The CMII footprint is enterprise-wide and the CMII methodologies go into much more depth. The CMII model gets down to the real problems and their root causes. Each business enterprise or government agency may choose to add the strengths of the CMII model to their existing EA methodologies. Why has this not happened?

The CMII certification program initiated in 1986 has close to 7,000 grads. The EA programs initiated in about 2000 probably have as many or more grads. Many work in the same organizations but with minimal interaction. The EA grads are aligned with the CIO and IT systems. The CMII grads are aligned with engineering and products.

The reasons for success and failure (shown on page 10) would have been much different if the responses had been from CMII grads.

Recommendations

Have a meeting. Get the EA grads together with the CMII grads. Find out what each other is doing or trying to do. Make this white paper required reading prior to the meeting.

Select the appropriate person to chair the meeting — preferably a good facilitator who is organizationally above both groups and capable of maintaining control. If attendees can be shown the potential positives right away, they should not feel that their domain is threatened.

The two choices appear to be obvious. Join forces and succeed together or continue to work separately and fail within your own silos. The obvious choice is to join forces. Do not give failure a chance. It will be one of the best meetings your organization has ever had.