

Innovate2010

IBM開發者大會

聯邦企業架構FEA 與DODAF之運用

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Let's **build** a smarter planet.

August 31, 2010 台北喜來登

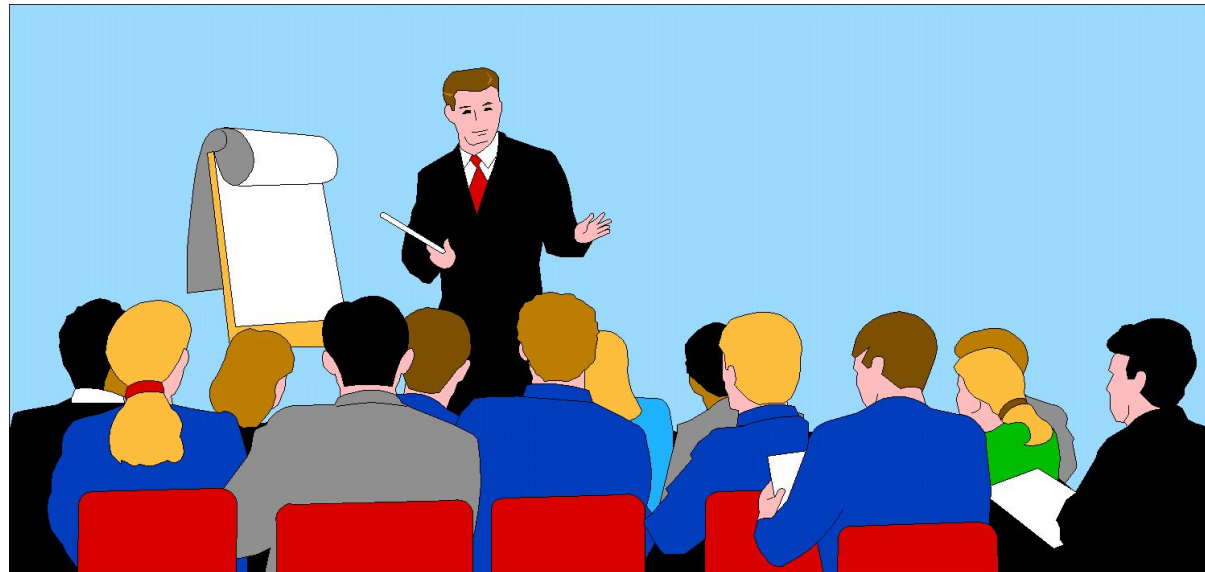


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壹. 前言



源 起



企業架構：1987年3月IBM期刊J.A. Zachman
所寫「資訊系統架構下的框架」

Zachman認為企業價值及靈活度是需從整體架
構的觀點來實踐的，不久又更名為「企業架構
框架」

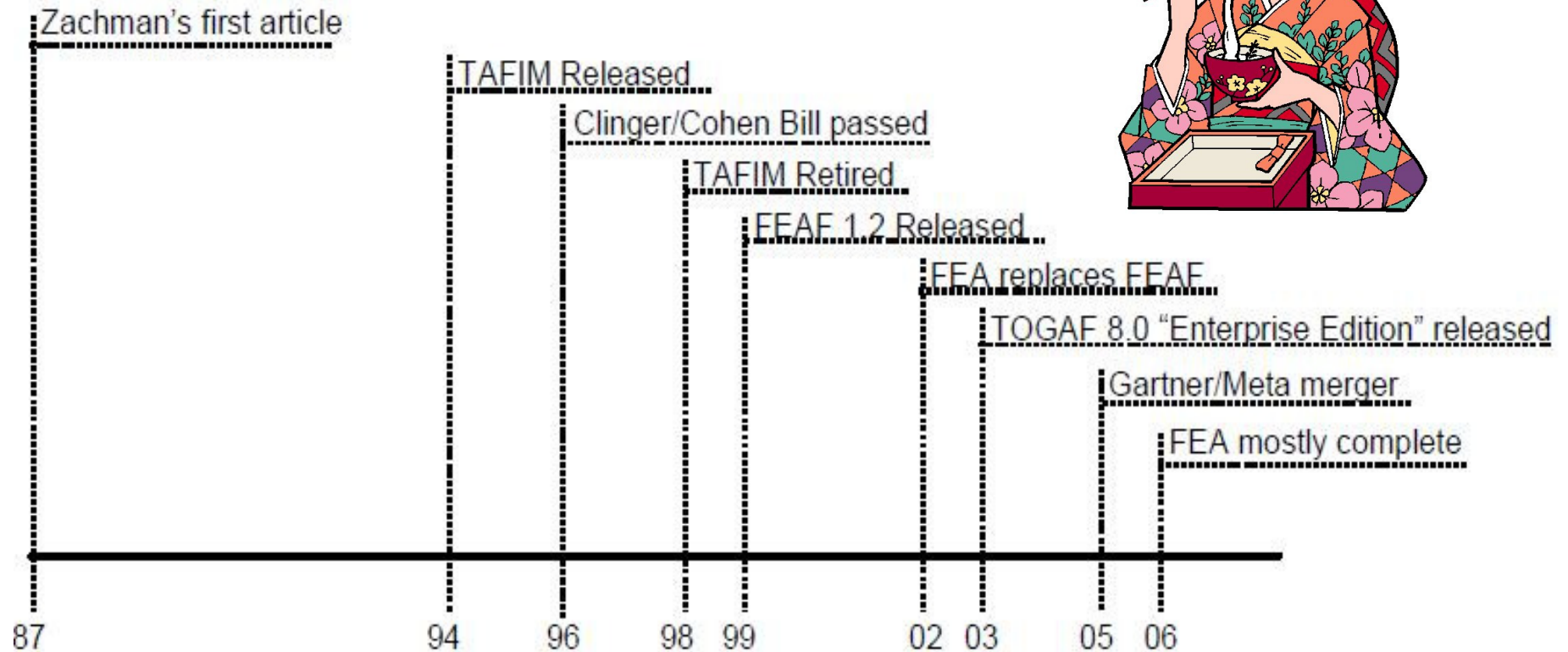
目的

在資訊技術領域上進行：協助決策、減少重複投資、投資績效最佳化、資訊分享、資訊資源整合等工作。

美國國防部的DoDAF受「聯邦企業架構規範」(FEA)之指導，協助達成以網路為中心(NCW)的環境。

DoDAF : Department of Defense Architecture Framework

發展沿革



TAFIM : Technical Architecture Framework for Information Management
FEAF : Federal Enterprise Architecture Framework



	DATA What	FUNCTION How	NETWORK Where	PEOPLE Who	TIME When	MOTIVATIO Why	
SCOPE (CONTEXTUAL) Planner	List of Things Important to the Business ENTITY = Class of Business Thing	List of Processes the Business Performs Process = Class of Business Process	List of Locations in which the Business Operates Node = Major Business Location	List of Organizations Important to the Business People = Major Organization Unit	List of Events/Cycles Significant to the Business Time = Major Business Event/Cycle	List of Business Goals/Strategies Ends/Mean = Major Business Goal/Strategy	SCOPE (CONTEXTUAL) <i>Planner</i>
BUSINESS MODEL (CONCEPTUAL) Owner	e.g. Semantic Model Ent = Business Entity Rein = Business Relationship	e.g. Business Process Model Proc. = Business Process I/O = Business Resources	e.g. Business Logistics System Node = Business Location Link = Business Linkage	e.g. Work Flow Model People = Organization Unit Work = Work Product	e.g. Master Schedule Time = Business Event Cycle = Business Cycle	e.g. Business Plan End = Business Objective Means = Business Strategy	BUSINESS MODEL (CONCEPTUAL) <i>Owner</i>
SYSTEM MODEL (LOGICAL) Designer	e.g. Logical Data Model Ent = Data Entity Rein = Data Relationship	e.g. Application Architecture Proc. = Application Function I/O = User Views	e.g. Distributed System Architecture Node = IIS Function (Processor, Storage, etc.) Link = Line Characteristics	e.g. Human Interface Architecture People = Role Work = Deliverable	e.g. Processing Structure Time = System Event Cycle = Processing Cycle	e.g., Business Rule Model End = Structural Assertion Means = Action Assertion	SYSTEM MODEL (LOGICAL) <i>Designer</i>
TECHNOLOGY MODEL (PHYSICAL) Builder	e.g. Physical Data Model Ent = Segment/Table/etc. Rein = Pointer/Key/etc.	e.g. System Design Proc. = Computer Function I/O = Data Elements/Sets	e.g. Technology Architecture Node = Hardware/Systems Software Link = Line Specifications	e.g. Presentation Architecture People = User Work = Screen Format	e.g. Control Structure Time = Execute Cycle = Component Cycle	e.g. Rule Design End = Condition Means = Action	TECHNOLOGY MODEL (PHYSICAL) <i>Builder</i>
DETAILED REPRESENTATIONS (OUT-OF-CONTEXT) Sub-contractor	e.g. Data Definition Ent = Field Rein = Address	e.g. Program Proc. = Language Statement I/O = Control Block	e.g. Network Architecture Node = Address Link = Protocol	e.g. Security Architecture People = Identity Work = Job	e.g. Timing Definition Time = Interrupt Cycle = Machine Cycle	e.g. Rule Specification End = Sub-condition Means = Step	DETAILED REPRESENTATIONS (OUT-OF-CONTEXT) <i>Sub-contractor</i>
FUNCTIONING ENTERPRISE	e.g. DATA	e.g. FUNCTION	e.g. NETWORK	e.g. ORGANIZATION	e.g. SCHEDULE	e.g. STRATEGY	FUNCTIONING ENTERPRISE

Enterprise Architecture

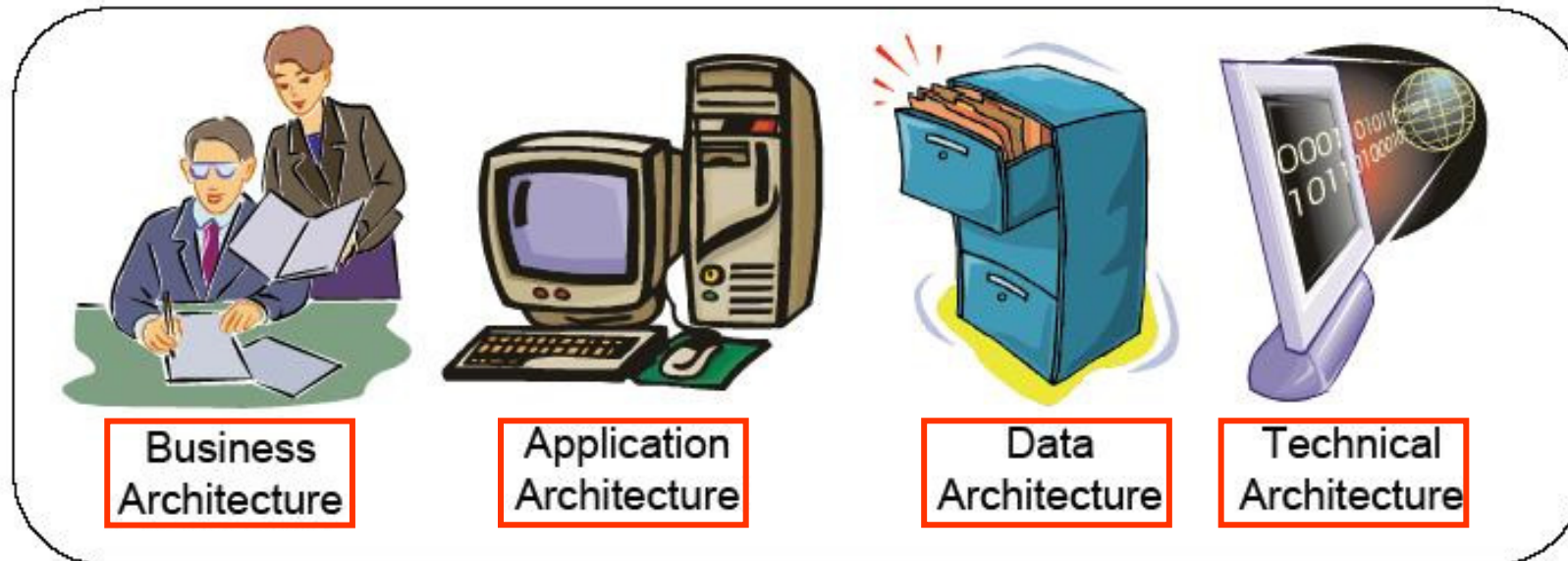


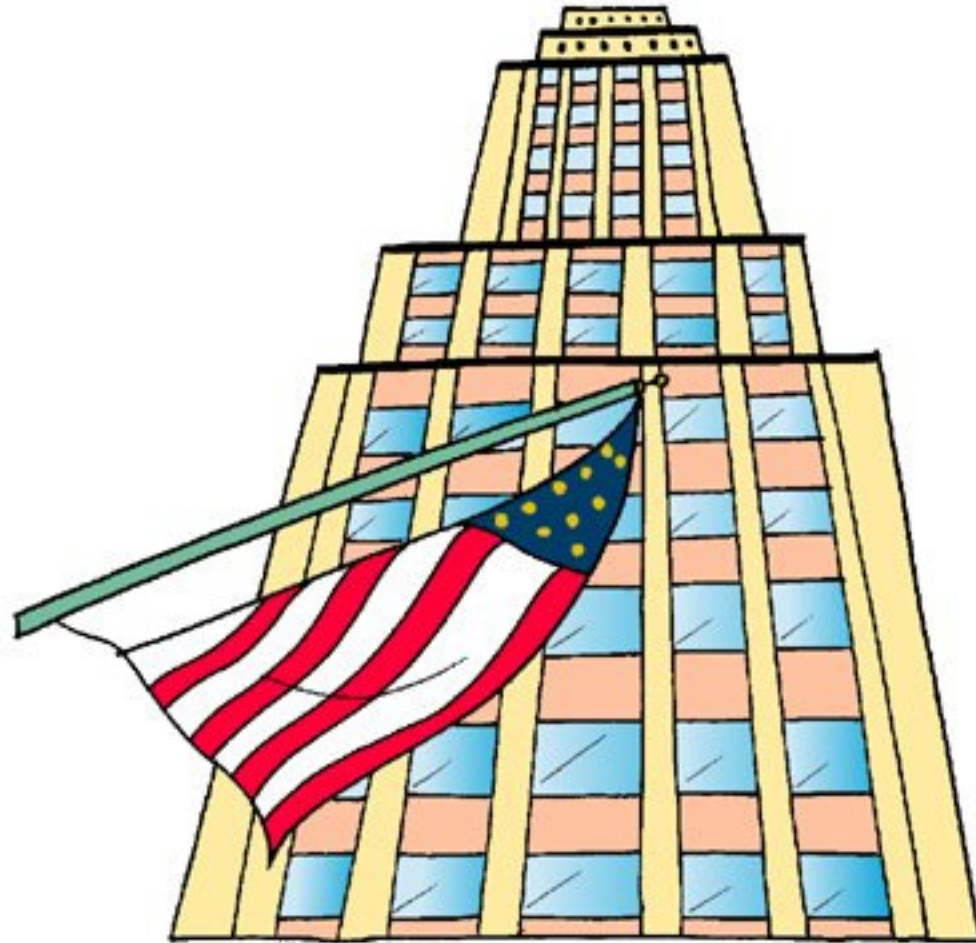
Figure 5. TOGAF's Enterprise Architecture

TOGAF : The Open Group Architectural Framework

As shown in this figure, TOGAF divides an enterprise architecture into four categories, as follows:

- Business architecture — Describes the processes the business uses to meet its goals
- Application architecture — Describes how specific applications are designed and how they interact with each other
- Data architecture — Describes how the enterprise datastores are organized and accessed
- Technical architecture — Describes the hardware and software infrastructure that supports applications and their interactions

貳. 聯邦企業架構FEA的法令依據



美國聯邦政府對其國內資訊技術的發展及各局、處投資建案的內容控管、成效評估是透過各種架構的法律規章來執行的



	法令規章	內容描述
1	Clinger-Cohen Act of 1996	讓各代理商認知到所要改進資訊管理之規範"資訊技術架構"，並宣告各資訊主官需擔負"資訊技術架構"內容之發展、維護、執行等工作責任，俾各代理商能確立其發展策略及方向，達致資訊資源管理之目標。
2	E-Government Act of 2002	在"企業架構"的發展上，檢討並接受各方建議，俾強化電子化政府執行的內容。
3	Office of Management and Budget Circular A-130	在"企業架構"的發展上，檢討並接受各方建議，俾建立金融投資規劃之控制，內容包括"企業架構"上的執行原則，規範的建立及維護等。
4	OMB Federal Enterprise Architecture Reference Models (FEA RM)	使用FEA之參考模組，來提昇聯邦政府下，有重疊工作的代理商作出交叉分析，俾確認重複投資的瓶頸；"DOD企業架構參考模組"與"聯邦企業架構參考模組"兩者已同時列出。
5	OMB Enterprise Architecture Assessment Framework (EAAF)	預算管理局的"企業架構評鑑框架"(EAAF)，扮演企業架構評鑑基礎，用以確認企業架構在資訊資源管理及資訊技術之投資決策上有進步性的發展。
6	General Accounting Office Enterprise Architecture Management Maturity Framework (EAMMF)	清楚指出在邁向一個穩定、成熟的企業架構時，如何使用"主計局企業架構管理框架"(EAMMF)來對架構的管理內容作出改進及修訂的建議。



FEA & DoDAF的法令内容包括：

1. The President's Management Agenda.
2. OMB A-11 Exhibit 300 submissions.
3. OMB FEA Practice Guidance.
4. OMB EA Assessment Guide.
5. OMB FEA Reference Models.
6. DoD EA Reference Model (RM) Taxonomy.
7. DoD EA Consolidated RM.
8. DoD EA Transition Strategy.
9. DoD Segment Architectures.
10. DoD EA Self-Assessment.
11. DoD Architecture Federation Strategy.

預算管理局(OMB)於2003年建立了聯邦企業架構 規範(Federal Enterprise Architecture,FEA)

OMB's Circular A-11：內閣層級包括國防部皆需
連結他們的預算書至聯邦企業架構規範，俾對任
務作出績效評估



OMB內的E-政府科、資訊技術科需支援聯邦資訊主管會議(CIO)建立聯邦企業架構規範(FEA)，促使整個聯邦政府走向企業導向的藍圖

聯邦企業架構規範管理課就位於OMB內，它負責提供OMB及聯邦政府各局、處在資訊技術領域上，一個共通語言及架構，俾提昇聯邦政府各部門間的合作及變革。



聯邦企業架構規範(FEA)的核心原則：

1. 企業導向的方法。
2. 提昇合作成效及再利用。
3. 透過EA資金投資過程，提昇效率。
4. 透過交叉代理及投資的改進過程，節省成本



叁. 聯邦企業架構FEA的內容

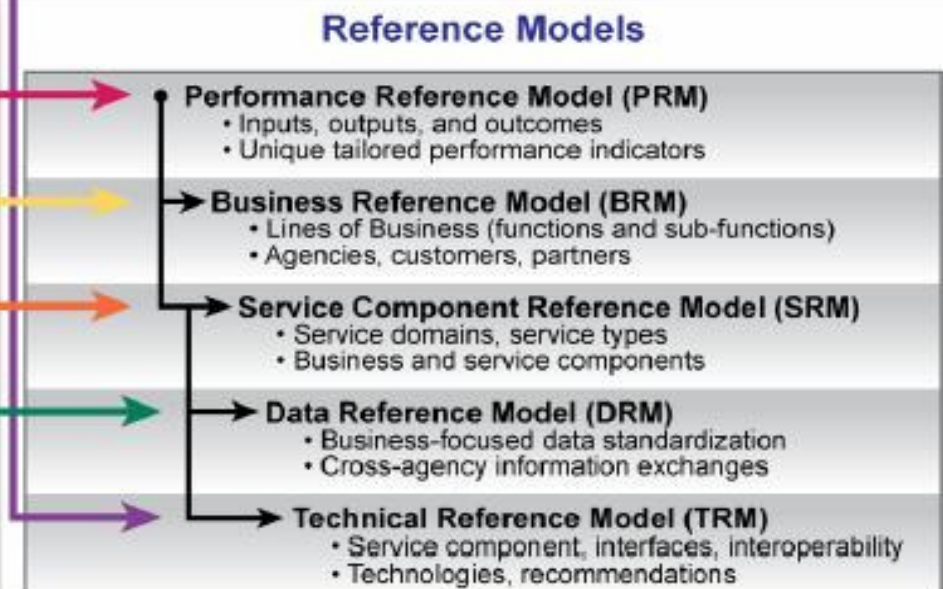
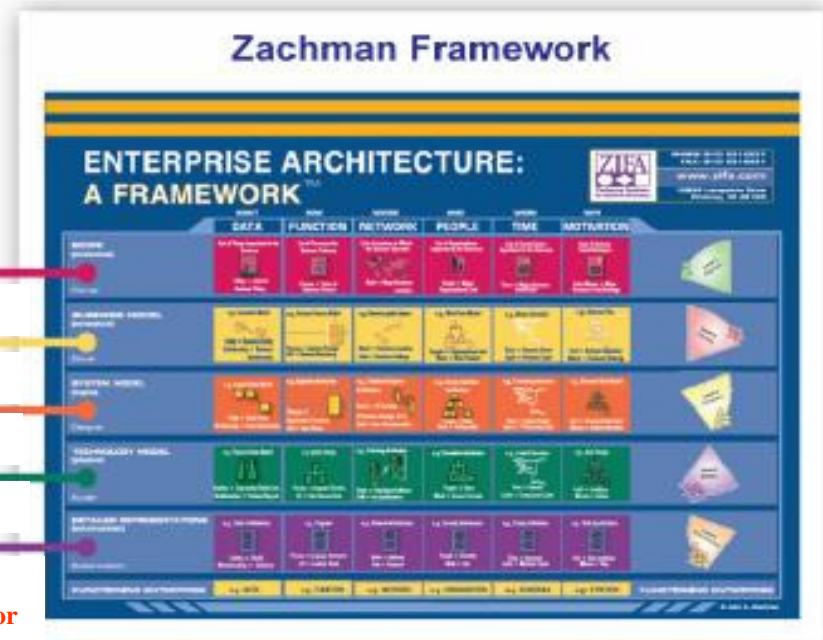
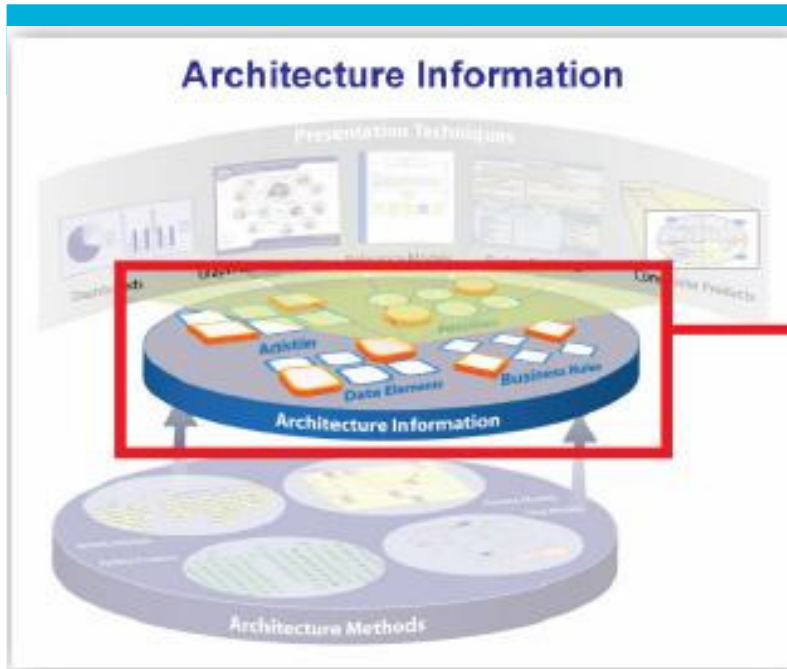


FEA由5個參考模組組成：

1. 績效參考模組(Performance Reference Model, PRM)
2. 企業參考模組(Business Reference Model, BRM)
3. 服務組件參考模組(Service Component Reference Model, SRM)
4. 資料參考模組(Data Reference Model, DRM)
5. 技術參考模組(Technical Reference Model, TRM)



A Notional Reference Model



企業參考模組(Business Reference Model, BRM)
自框架的角度，使各組織內部作業，可以獨立於局
、處之組織格局來運作。
跨部會合作以為電子化政府策略的基礎。



服務組件參考模組(Service Component Reference Model,SRM)
以企業導向之理念，對聯邦政府各局、處在IT資產及投資，作出確認及分類。
協助各公司對其IT資產之再運用。



資料參考模組(Data Reference Model, DRM) 定義資料描述的標準方法。

每一資料有三個標準格式，包括：

資料描述：整齊的資料描述格式俾支援不同領域的運用
及分享

資料上下內容：各項權威資料的定義皆源自CommCOI

資料分享：在支援資料使用上，係透過資料的上下內容
及標準描述來達成的



技術參考模組(Technical Reference Model, TRM)
它是組件導向(component-driven)，訂定各式標準來
整合現有聯邦政府各局、處及電子化政府。
例如：http是傳輸服務一個界面標準。



肆. 聯邦企業架構FEA的案例



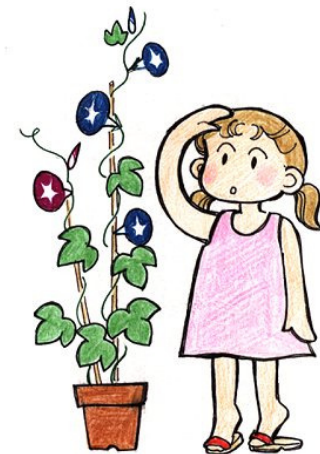
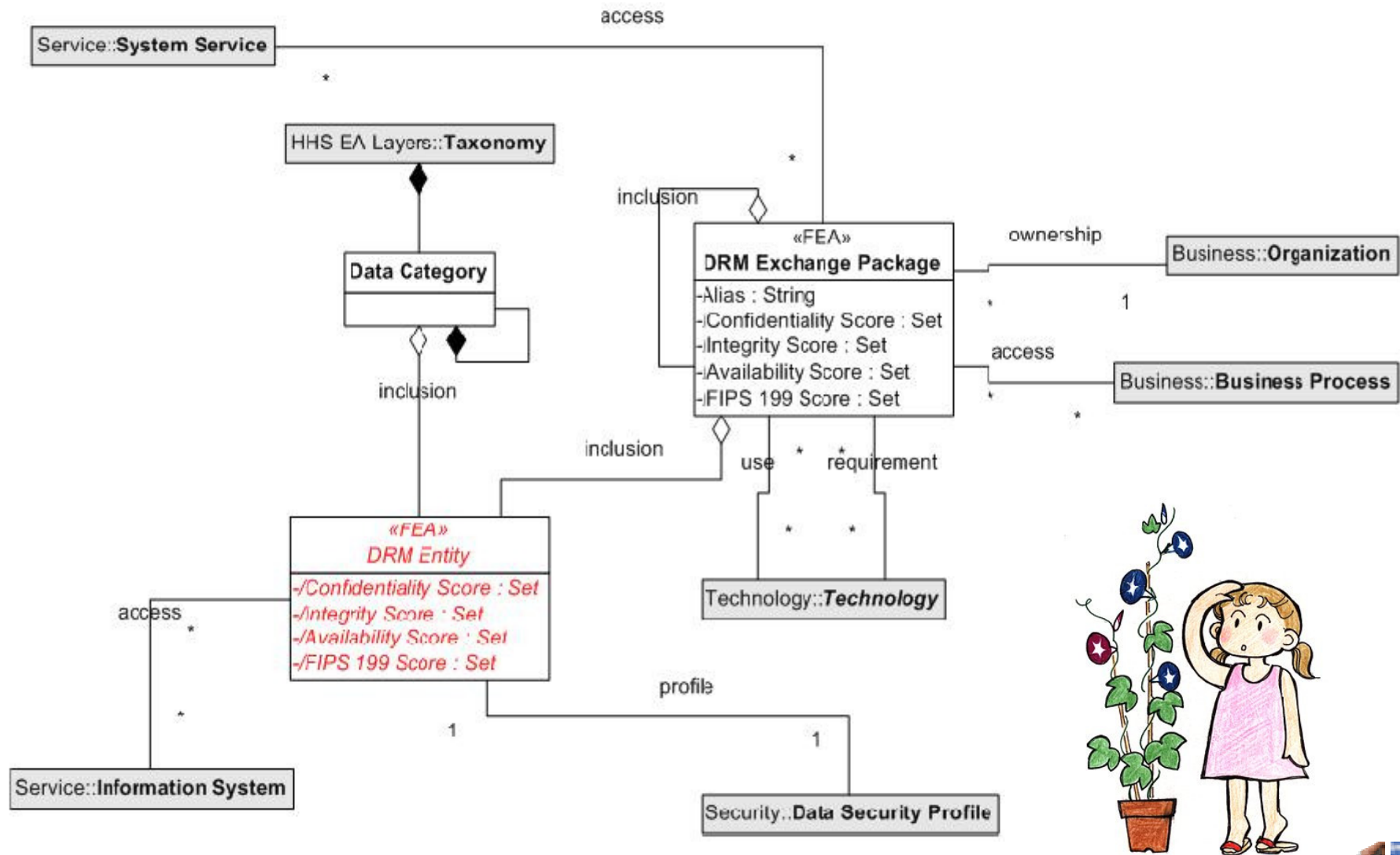
美國國民健康部架構規範(HHS-EA)由8個layer組成：
(United States Department of Health & Human Services)



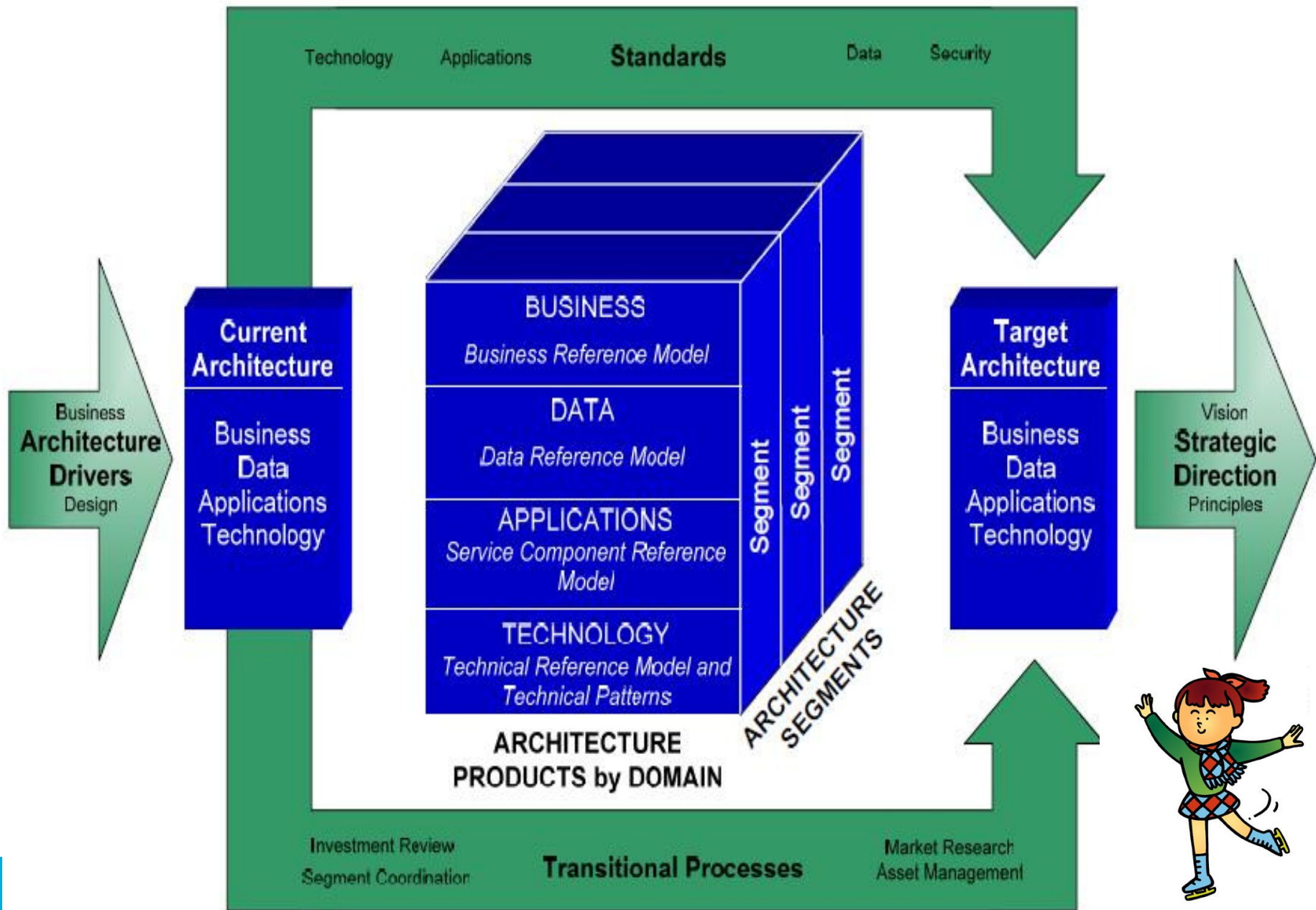
- 美國國民健康部架構規範(HHS-EA)由8個layer組成：
- (United States Department of Health & Human Services)
1. Strategy Layer(Performance Reference Model, PRM)
 2. Business Layer(Business Reference Model, SRM)
 3. Data Layer(Data Reference Model, DRM)
 4. Service Layer(Service Component Reference Model, TRM)
 5. Technology Layer(Technical Reference Model, TRM)
 6. Workforce Layer
 7. Investment Layer
 8. Facilities Layer



Data Layer(Data Layer Metamodel Overview Diagram)



California Enterprise Architecture Framework

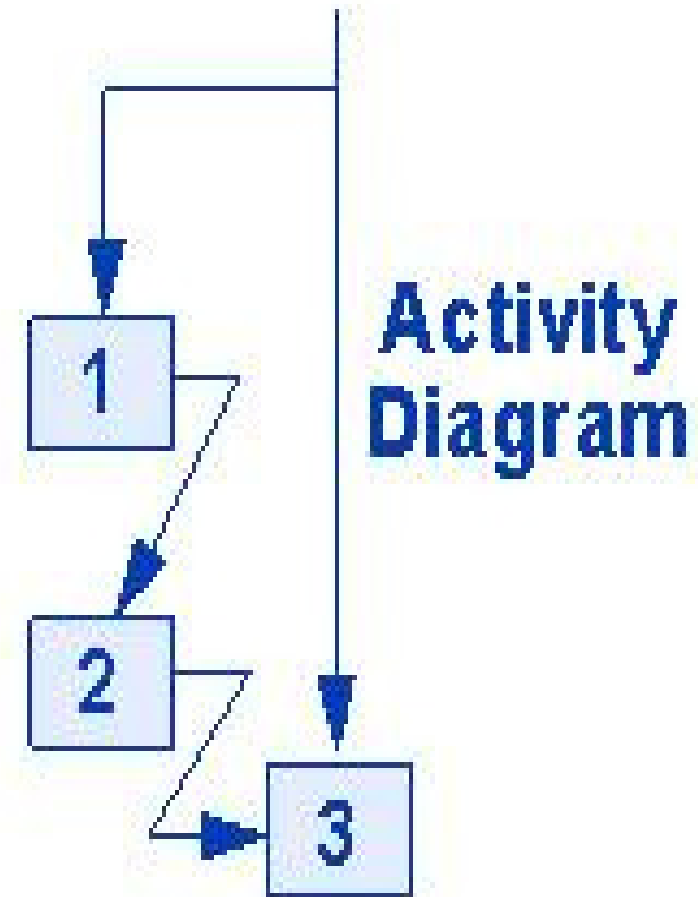
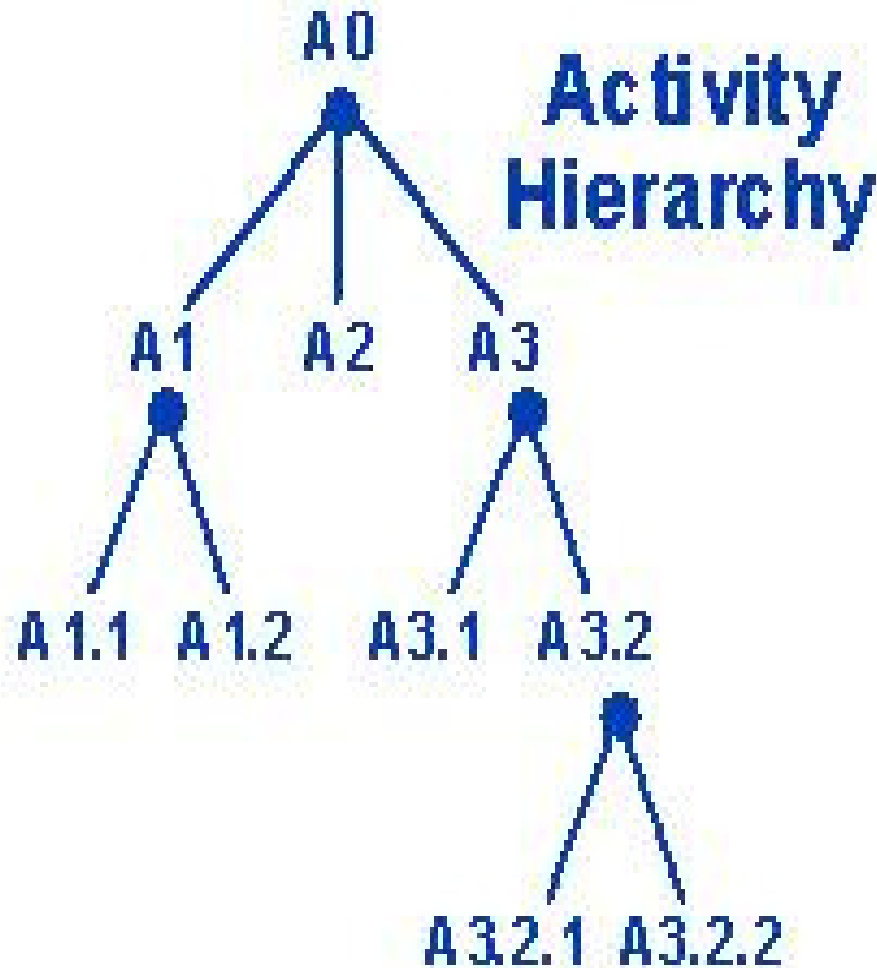


Treasury Enterprise Architecture Framework

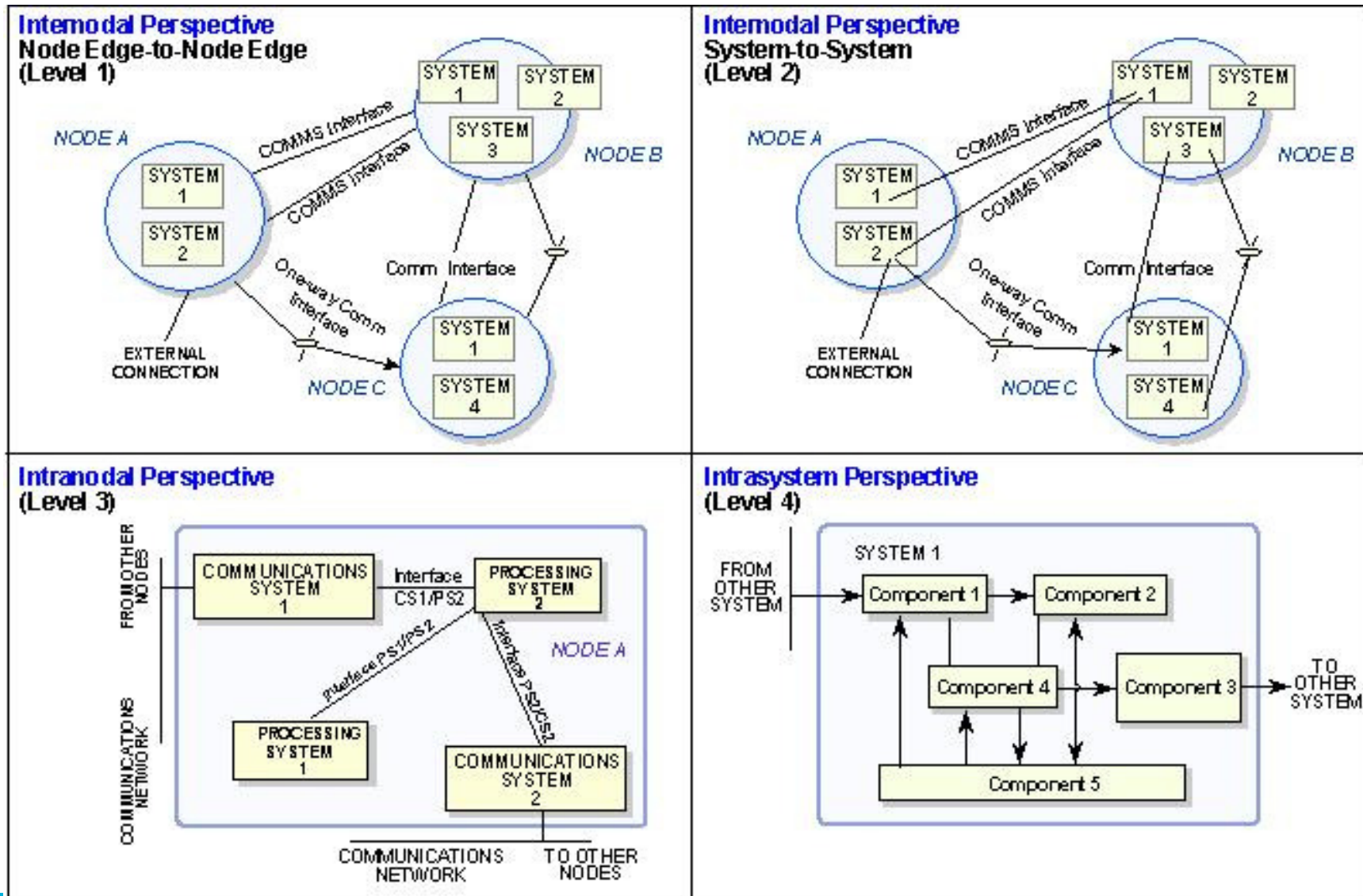
	Functional View	Information View	Organizational View	Infrastructure View
Planner Perspective	Mission & Vision Statements	Information Dictionary	Organization Chart	Technical Reference Model Standards Profile
Owner Perspective	Activity Model Information Assurance Trust Model	Information Exchange Matrix (Conceptual)	Node Connectivity Description (Conceptual)	Information Assurance Risk Assessment System Interface Description Level 1
Designer Perspective	Business Process/ System Function Matrix Event Trace Diagrams State Charts	Information Exchange Matrix (Logical) Data CRUD Matrices Logical Data Model	Node Connectivity Description (Logical)	System Interface Description Levels 2 & 3
Builder Perspective	System Functionality Description	Information Exchange Matrix (Physical) Physical Data Model	Node Connectivity Description (Physical)	System Interface Description Level 4 System Performance Parameters Matrix



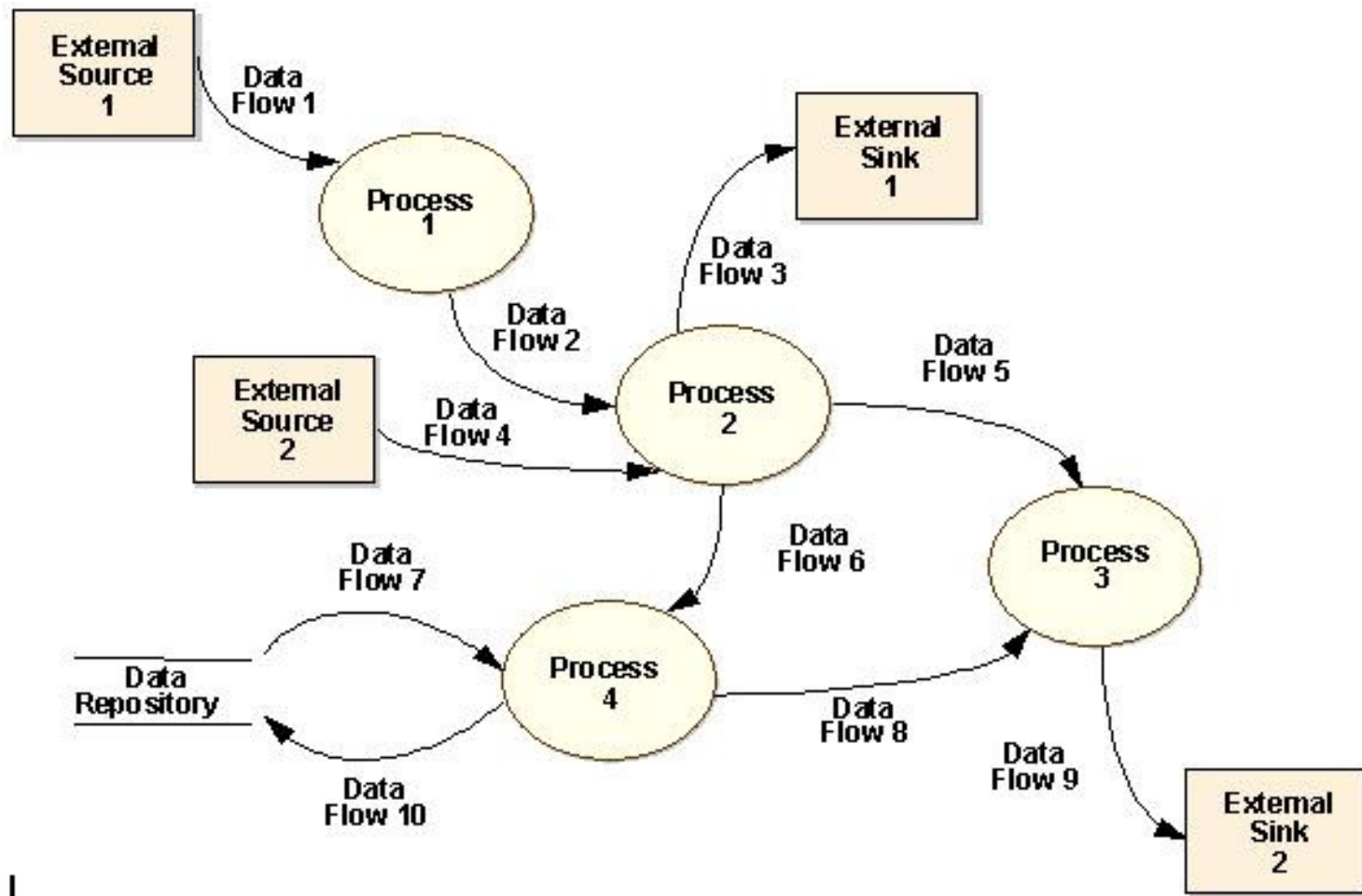
Treasury Enterprise Architecture Framework



Treasury Enterprise Architecture Framework



Treasury Enterprise Architecture Framework



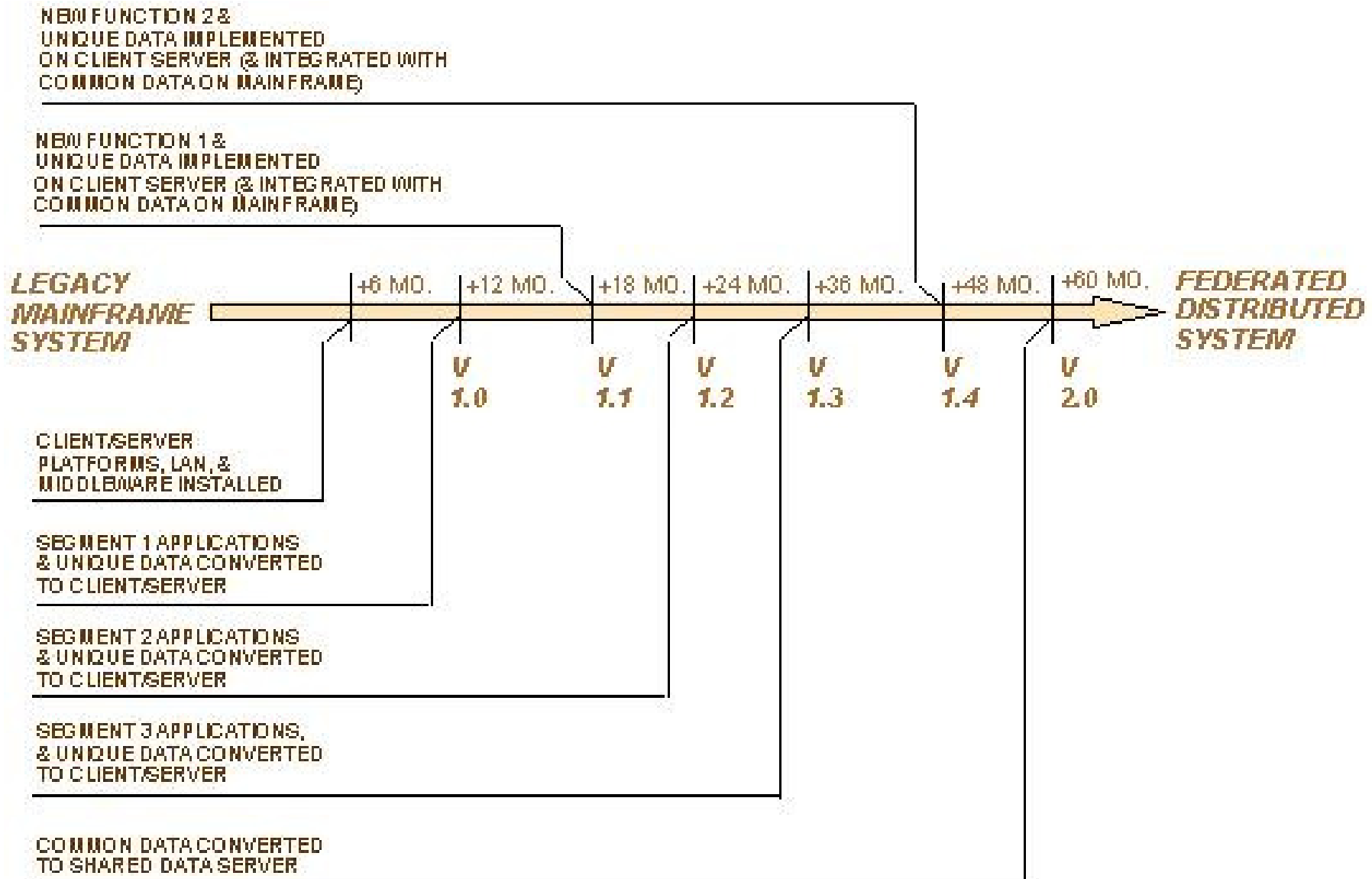
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Treasury Enterprise Architecture Framework

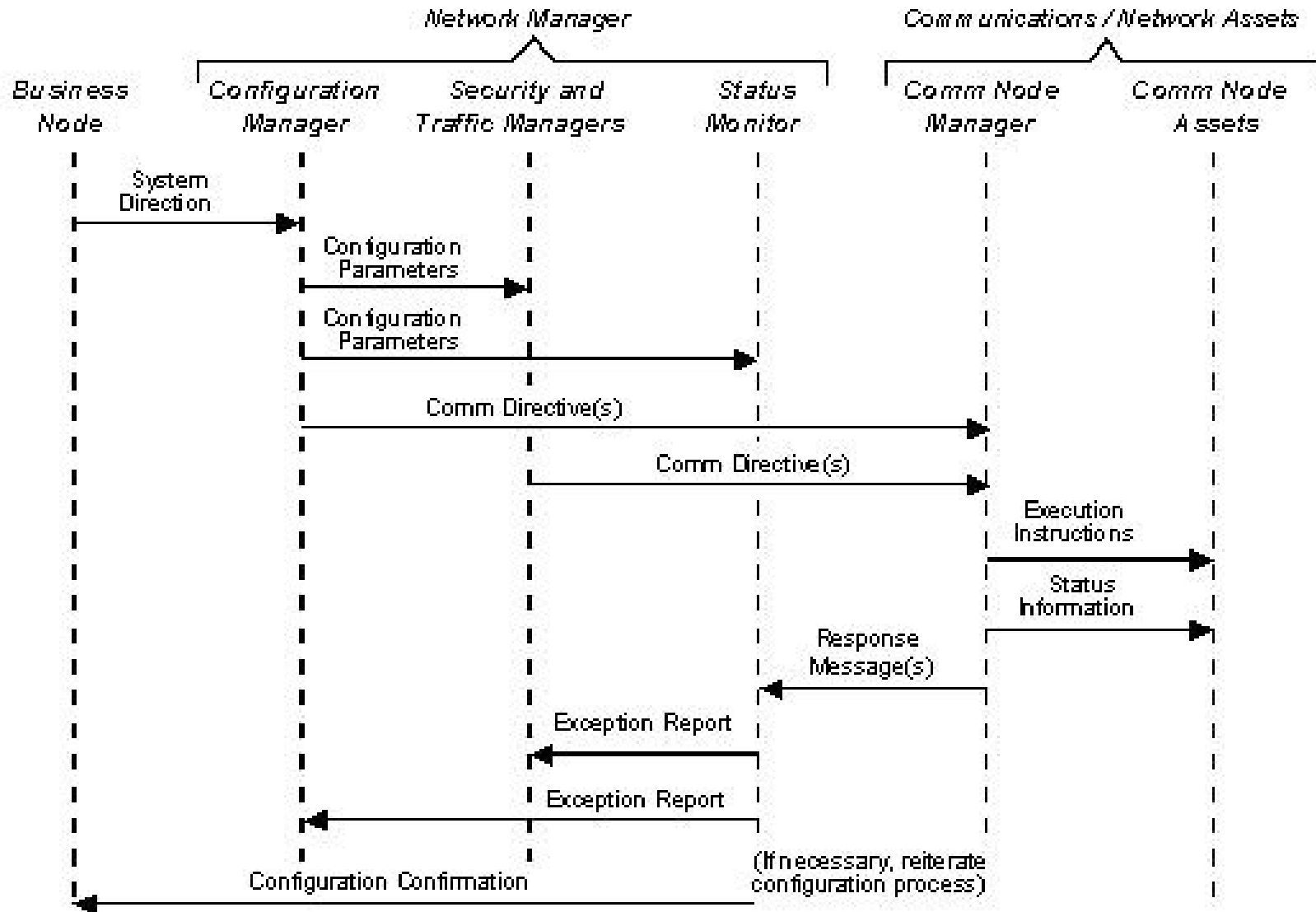
System Name	Performance Thresholds/Measures		
	Time ₀ (Baseline)	Time ₁	Time ₂ (Target)
Hardware Element 1			
Maintainability			
Availability			
System Initialization Rate			
Data Transfer Rate			
Program Restart Rate			
Software Element 1/Hardware Element 1			
Data Capacity (throughput or # of input types)			
Automatic Processing Responses (by input type, # processed/unit time)			
Operator Interaction Response Times (by type)			
Effectiveness			
Availability			
Mean time between software failures			
Software Element 2/Hardware Element 1			
...			
Hardware Element 2			
...			



Treasury Enterprise Architecture Framework



Treasury Enterprise Architecture Framework



伍. 聯邦企業架構FEA的執行過程



FEA執行手冊描述，各層級的發展過程如下：

步驟1：架構分析：定義出一個觀點(as-is)。

步驟2：架構定義：將目標文件化，找出(to be)



- 步驟3：思考(to-be)專案如何運用資金。
- 步驟4：製作(to-be)專案的管理及執行內容。



陸. 聯邦企業架構FEA的執行評鑑



依FEA Assessment Framework 2.1，其執行成果的評分是透過三個範疇來評估的：

1. 架構的完成度：劃分成5等級
2. 架構的運用度：各局、處在決策時，運用架構的效率
3. 架構的結果度：運用架構後的好處



架構的完成度之等級

Level	Name	Description
1	Initial	The enterprise is using informal and ad-hoc EA processes. <u>Some architectural artifacts for a given architectural level may exist, but the levels are not linked, or the linkage is incomplete.</u> (架構內容部份存在，且不完全連結)
2	Baseline	The enterprise has developed a baseline (as-is) architecture. <u>The architecture has enterprise-wide scope and the linkages between levels are well established and clearly articulated.</u> (架構內容已相互連結)
3	Target	The enterprise has developed both a baseline architecture (as described above) and a target (goal) architecture. <u>The target architecture is aligned to enterprise-wide goals and organizational responsibilities.</u> The target architecture addresses the priorities and performance objectives identified in the enterprise business plan. (架構內容已標示出目標及相互責任)
4	Integrated	The enterprise has developed <u>at least vertically partitioned architecture that has been approved by the business owner in writing.</u> <u>The relevant organization(s) within the enterprise are actively migrating toward the relevant architecture.</u> (組織已朝向架構之目標發展)
5	Optimized	The enterprise has developed multiple vertically partitioned architectures that support core mission business functions, all approved by the appropriate business owners. (架構之目標已達致並持續最佳化之發展)

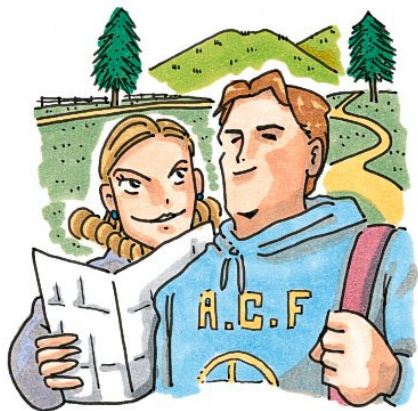
OMB評定其等級如下：

綠燈：完成度、運用度、結果度都很好

黃燈：完成度很好、運用度、結果度兩者有一為
很好

紅燈：完成度、運用度、結果度都未完整

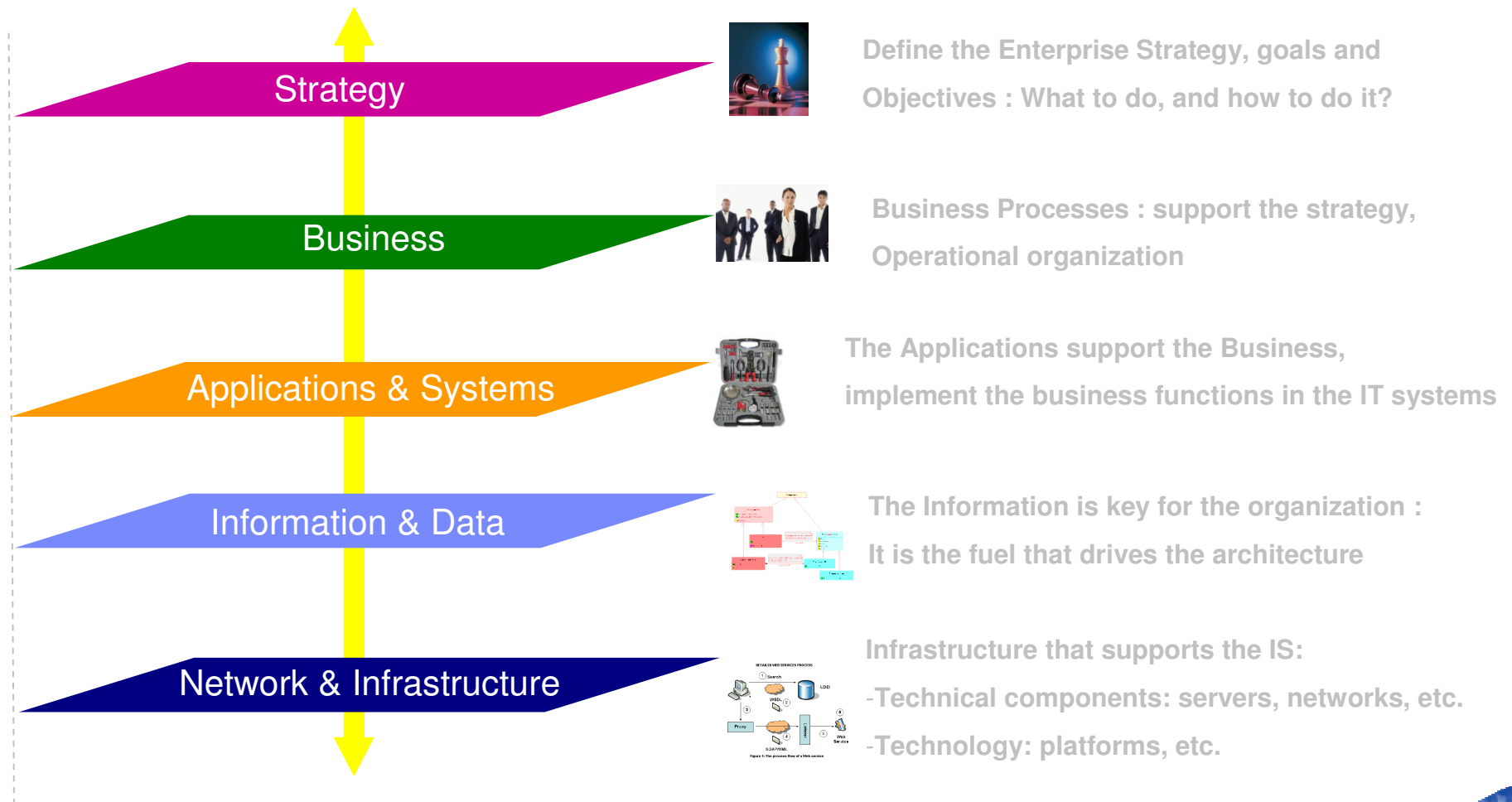
私人企業亦按此方式對其架構化進行評分



柒. 聯邦企業架構FEA的導入



何謂Enterprise Architecture?

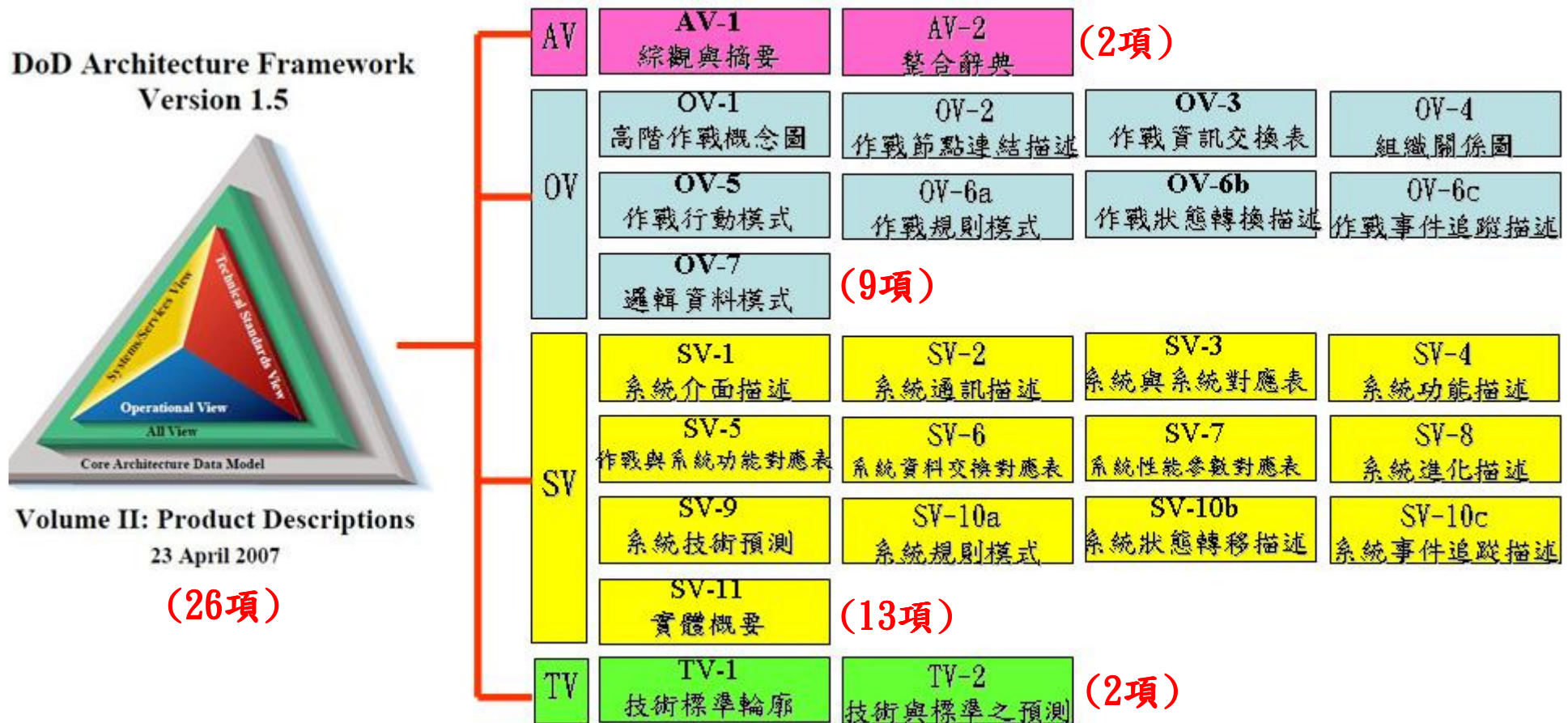


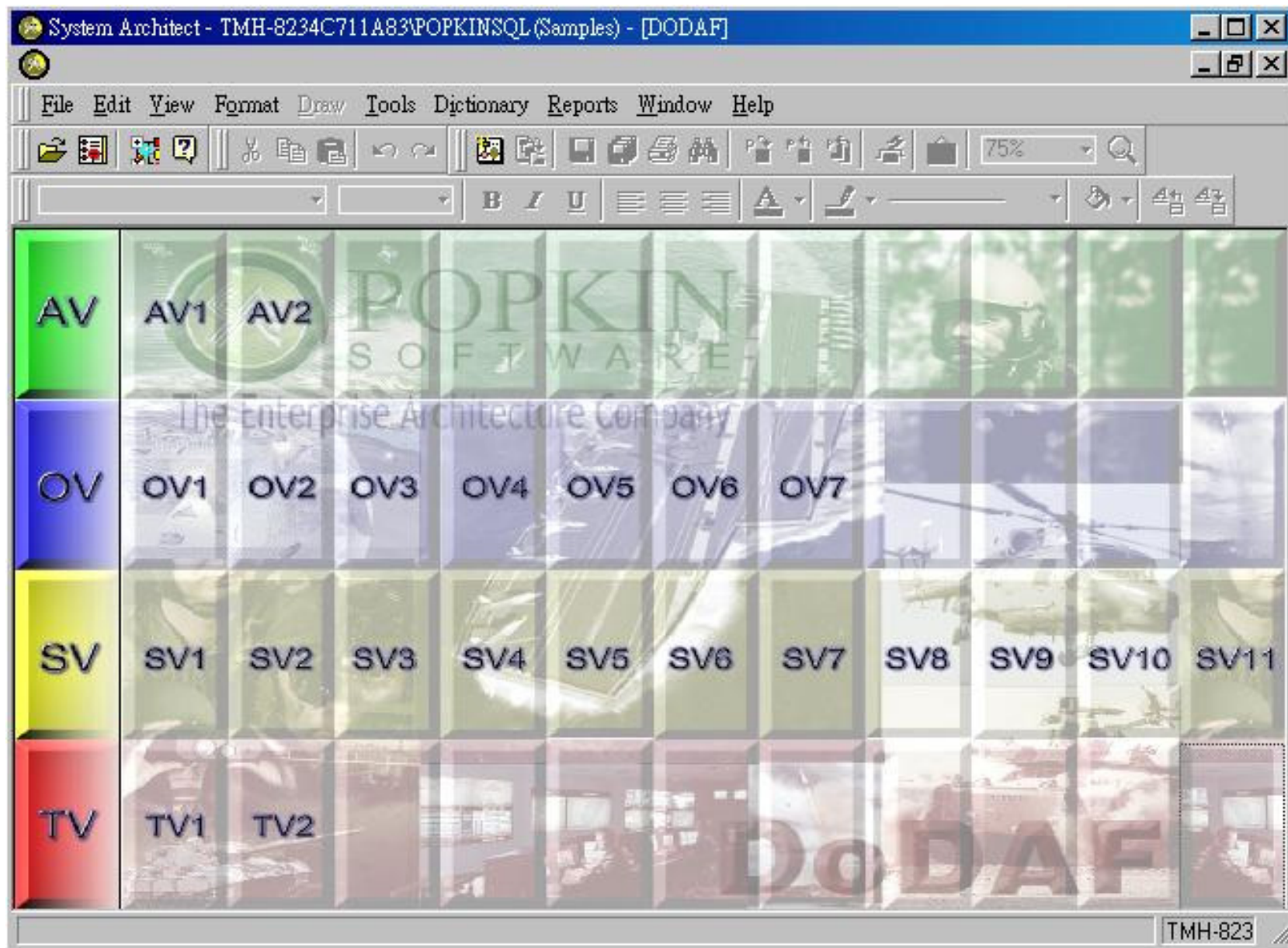
捌. DoDAF的運用



DoDAF : Department of Defense Architecture Framework

DoDAF V1.5(2007年4月)之內容：





高階作戰概念圖OV-1

High-Level Operational Concept Graphic

功能：使用圖形以高階概念方式來描述作戰任務

目的：提供一個迅速、高階層次的描述



作戰節點連結描述OV-2

Operational Node Connectivity Description

功能：以圖形方式描述作戰節點，包括外部與內部的作戰節點

目的：追蹤由特定作戰節點至其他節點的資訊交換需求



系統介面描述SV-1

Systems Interface Description

功能：確認系統節點與節點間、系統與系統間的介面。

目的：藉由描述作戰節點連結來描述系統節點和系統間之介面，將作戰觀點(OV)與系統觀點(SV)鏈結在一起



系統通訊描述SV-2

Systems Communications Description

功能：提供系統介面描述(SV-1)實體
傳輸方法的通信系統、路徑。

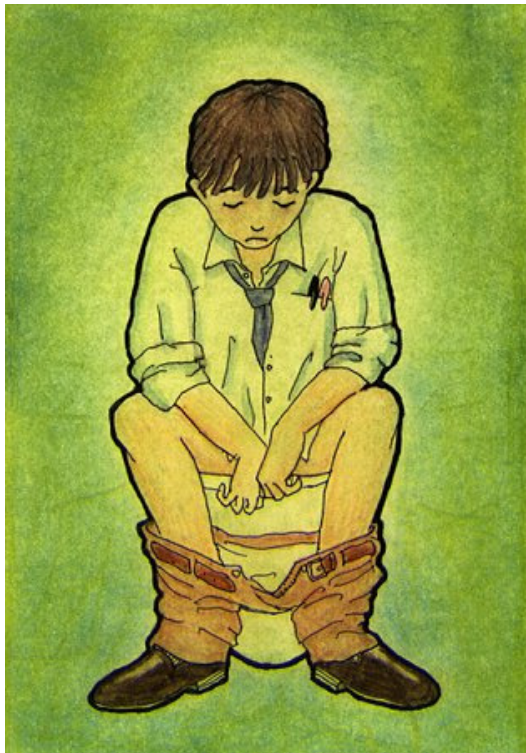
目的：詳細描述架構中各系統的界面
及通訊工具。



DoDAF Version 2.0(2009, 5月)各模式產品內容

AV綜合觀點	OY作戰觀點	SV系統觀點	StdV標準觀點	DIV資料資訊觀點	CV戰力觀點	SvcV服務觀點	PV專案觀點
AV-1綜觀與摘要	OY-1高階作戰概念圖	SV-1系統介面描述	StdV-1各解決元素標準	DIV-1觀念資料模式	CV-1戰力觀點	SvcV-1服務的組成描述	PV-1專案的全面組合關係
AV-2整合辭典	OY-2作戰資源流動描述	SV-2系統資源流動描述	StdV-2標準預測	DIV-2邏輯資料模式	CV-2戰力分類	SvcV-2服務資源流動描述	PV-2專案與時間的關係
(2)	OY-3作戰資源流動矩陣	SV-3系統與系統對應矩陣	(2)	DIV-3實體資料模式	CV-3戰力的各階段內容	SvcV-3系統與服務的對應矩陣	PV-3專案與戰力的關係
	OY-4組織關係圖	SV-4系統功能描述		(3)	CV-4戰力的相依關係	SvcV-4服務的功能描述	(創新.3)
	OY-5a作戰活動分解樹	SV-5a作戰行動與系統功能追蹤對應表		CV-5戰力與組織發展的對應關係	SvcV-5作戰活動對服務功能的追溯性矩陣		
	OY-5b作戰行動模式	SV-5b作戰行動與系統追蹤對應表		CV-6戰力與作戰行動的對應關係	SvcV-6服務資源的流動矩陣		
	OY-6a作戰規則模式	SV-6系統資源流動矩陣		CV-7戰力與服務的對應關係	SvcV-7服務功能的計量矩陣		
	OY-6b狀態轉換描述	SV-7系統計量矩陣		(創新.7)	SvcV-8服務功能的進化描述		
	OY-6c事件追蹤描述	SV-8系統進化描述		DoDAF Version 1.5	SvcV-9服務技術及技能的預測		
	(9)	SV-9系統技術預測			(29)	SvcV-10a服務功能的規則模式	
		SV-10a系統規則模式			SvcV-10b服務功能的狀態轉移描述		
		SV-10b系統狀態轉換描述			SvcV-10c服務功能的事件追蹤描述		
SV-10c系統事件追蹤描述		(13)	(創新.13)				
(23)							

DoDAF 2.0(2009,5月)的架構文件除了架構產品外，還包括了涵蓋範圍外的特定觀點，因為一些過程規格的未知，導致架構發展者在製作各模式產品時有茫然之感覺。





Q & A



Applicable View	Framework Product	Framework Product Name
All Views	AV-1	Overview and Summary Information
All Views	AV-2	Integrated Dictionary
Operational	OV-1	High-Level Operational Concept Graphic
Operational	OV-2	Operational Node Connectivity Description
Operational	OV-3	Operational Information Exchange Matrix
Operational	OV-4	Organizational Relationships Chart
Operational	OV-5	Operational Activity Model
Operational	OV-6a, b, c	Operational Activity Sequence and Timing Descriptions
Operational	OV-7	Logical Data Model
Systems	SV-1	Systems Interface Description
Systems	SV-2	Systems Communications Description
Systems	SV-3	Systems-Systems Matrix
Systems	SV-4	Systems Functionality Description
Systems	SV-5	Operational Activity to Systems Function Traceability Matrix
Systems	SV-6	Systems Data Exchange Matrix
Systems	SV-7	Systems Performance Parameters Matrix
Systems	SV-8	Systems Evolution Description
Systems	SV-9	Systems Technology Forecast
Systems	SV-10a, b, c	Systems Functionality Sequence and Timing Descriptions
Systems	SV-11	Physical Schema
Technical	TV-1	Technical Standards Profile
Technical	TV-2	Technical Standards Forecast