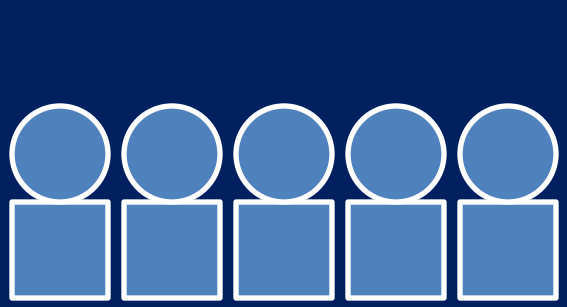
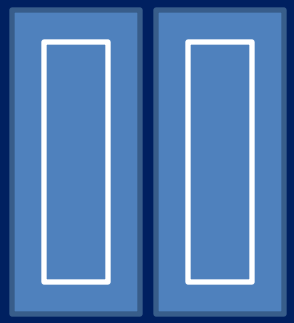
Architecting the Cloud: Enterprise Architecture Patterns for Cloud Computing

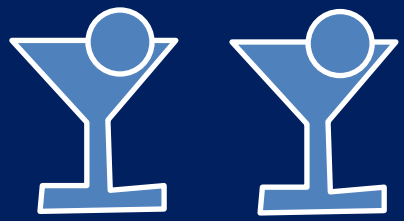
Prakash C. Rao VP/Chief Architect MMC Ltd
Claudia Rose President/BBII Enterprises
Faculty: FEAC Institute

A tough place to be!



Our Talk





Audience

4:30PM

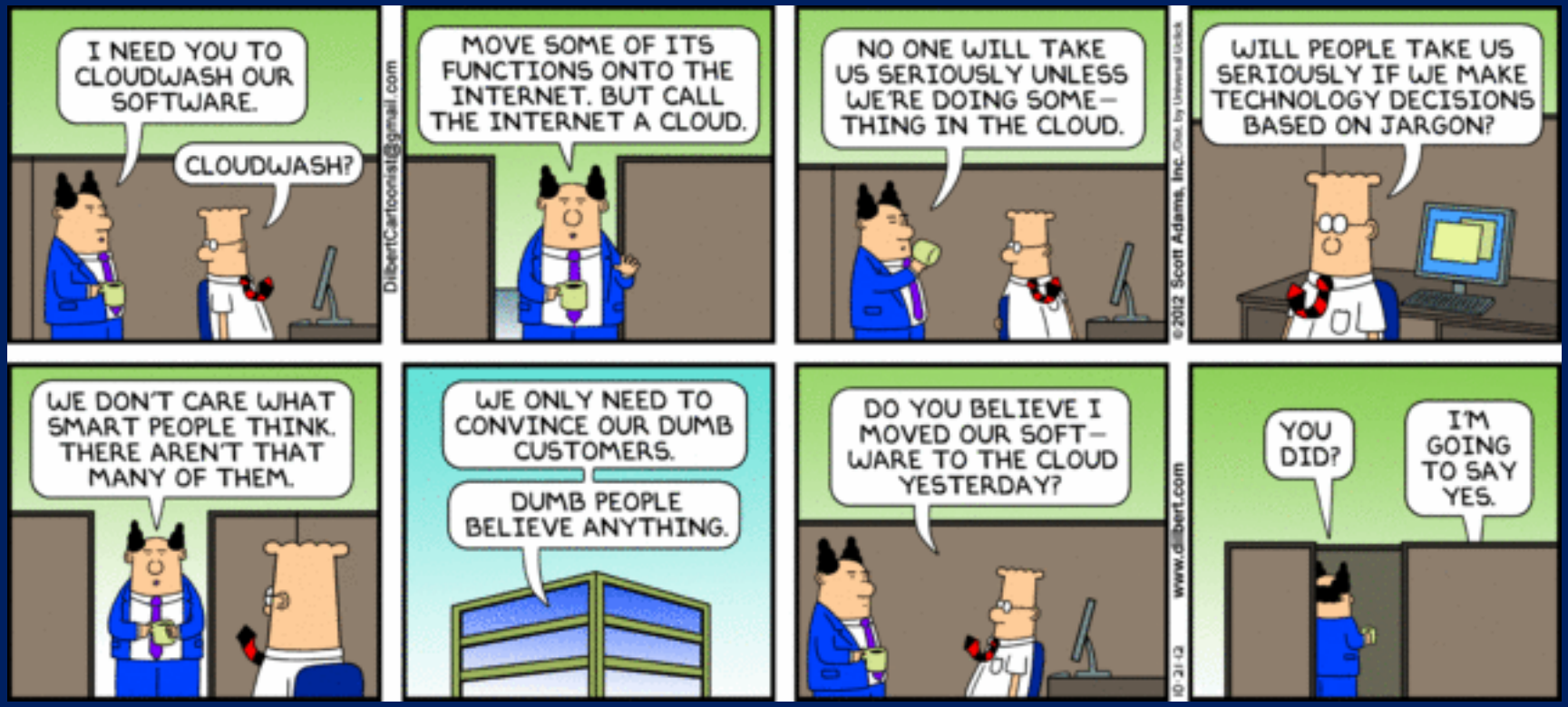
Doors

5:00 PM

Happy Hour

5:01 PM

Cloudwash


I NEED YOU TO CLOUDWASH OUR SOFTWARE.
CLOUDWASH?
DilbertCartoonist@gmail.com
MOVE SOME OF ITS FUNCTIONS ONTO THE INTERNET. BUT CALL THE INTERNET A CLOUD.
NO ONE WILL TAKE US SERIOUSLY UNLESS WE'RE DOING SOME-THING IN THE CLOUD.
©2012 Scott Adams, Inc.
WILL PEOPLE TAKE US SERIOUSLY IF WE MAKE TECHNOLOGY DECISIONS BASED ON JARGON?
WE DON'T CARE WHAT SMART PEOPLE THINK. THERE AREN'T THAT MANY OF THEM.
WE ONLY NEED TO CONVINCE OUR DUMB CUSTOMERS.
DUMB PEOPLE BELIEVE ANYTHING.
DO YOU BELIEVE I MOVED OUR SOFT-WARE TO THE CLOUD YESTERDAY?
www.dilbert.com
YOU DID?
I'M GOING TO SAY YES.

Balancing the Rush to Implementation

Some Key Principles

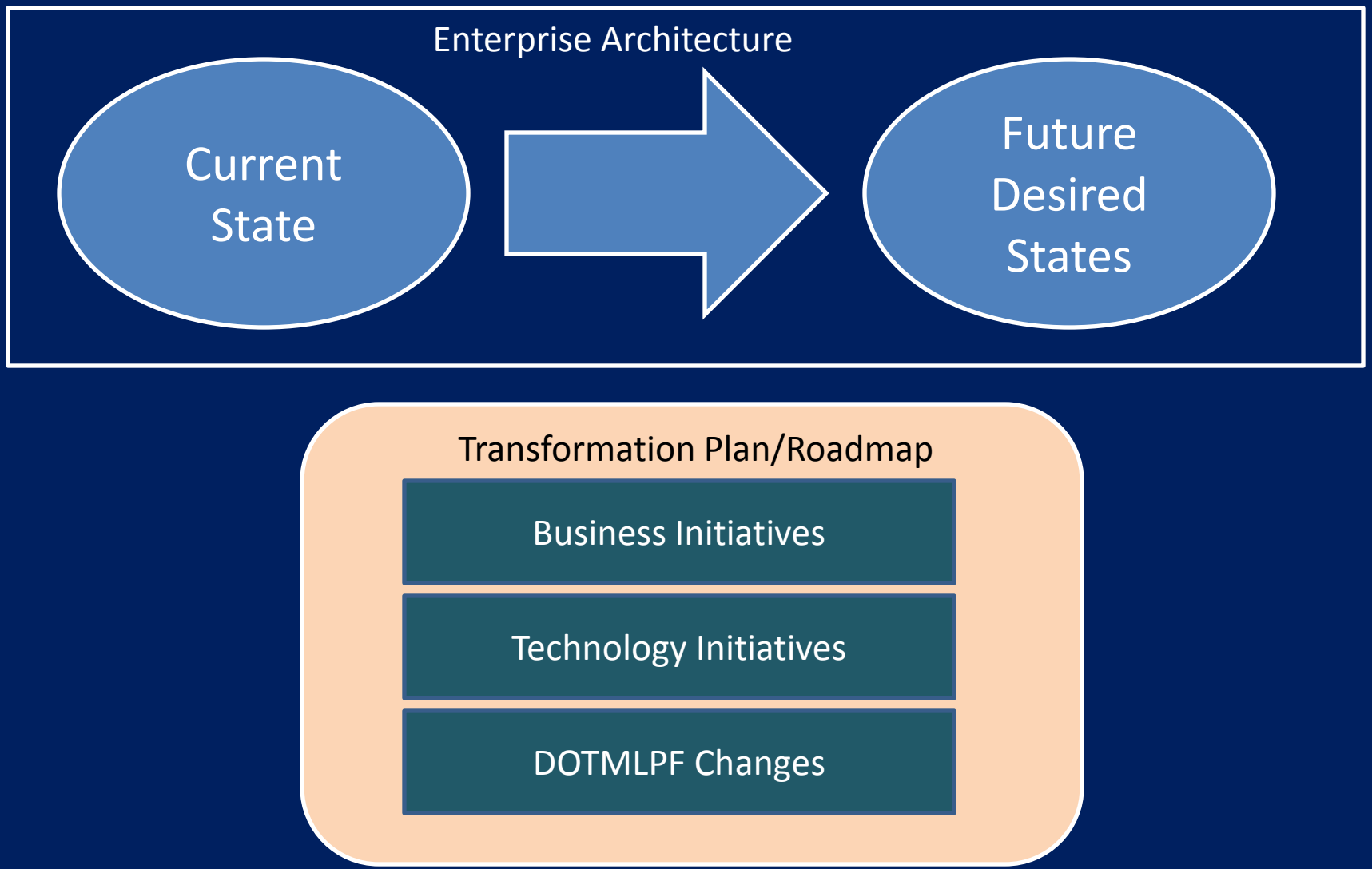
- Enterprises are constantly transforming themselves to exist, survive and adapt
- Enterprise Architecture is used to drive the planning process
- Solutions Engineering is used to drive the solution building
- An initiative is a unit of planned transformation

Some Key Principles

- Today's initiatives are often collaborations between IT & the business
- Cloud computing is a type of information technology transformation initiative
- Enterprise Patterns reflect the nature of the Business
- Analysis Patterns are used to support Planning
- Solution Patterns are used to support Engineering

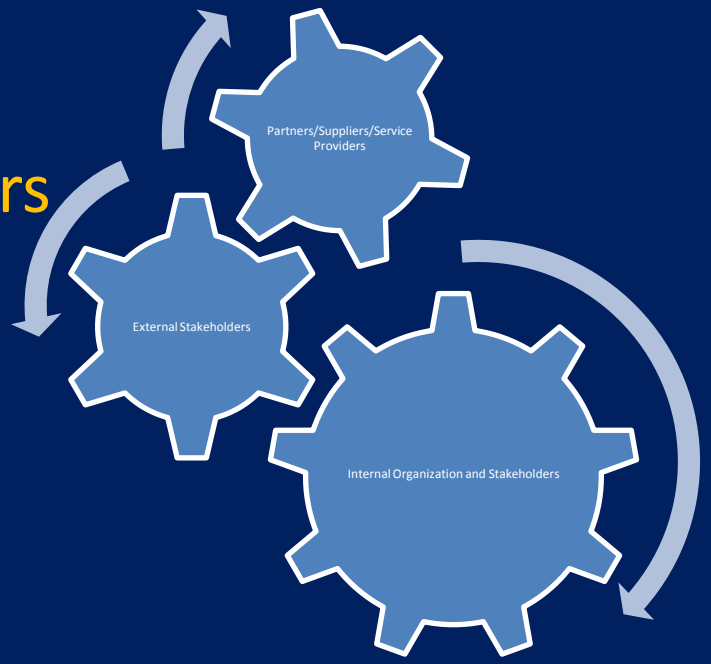
This presentation will address PLANNING concerns

Enterprise Transformation

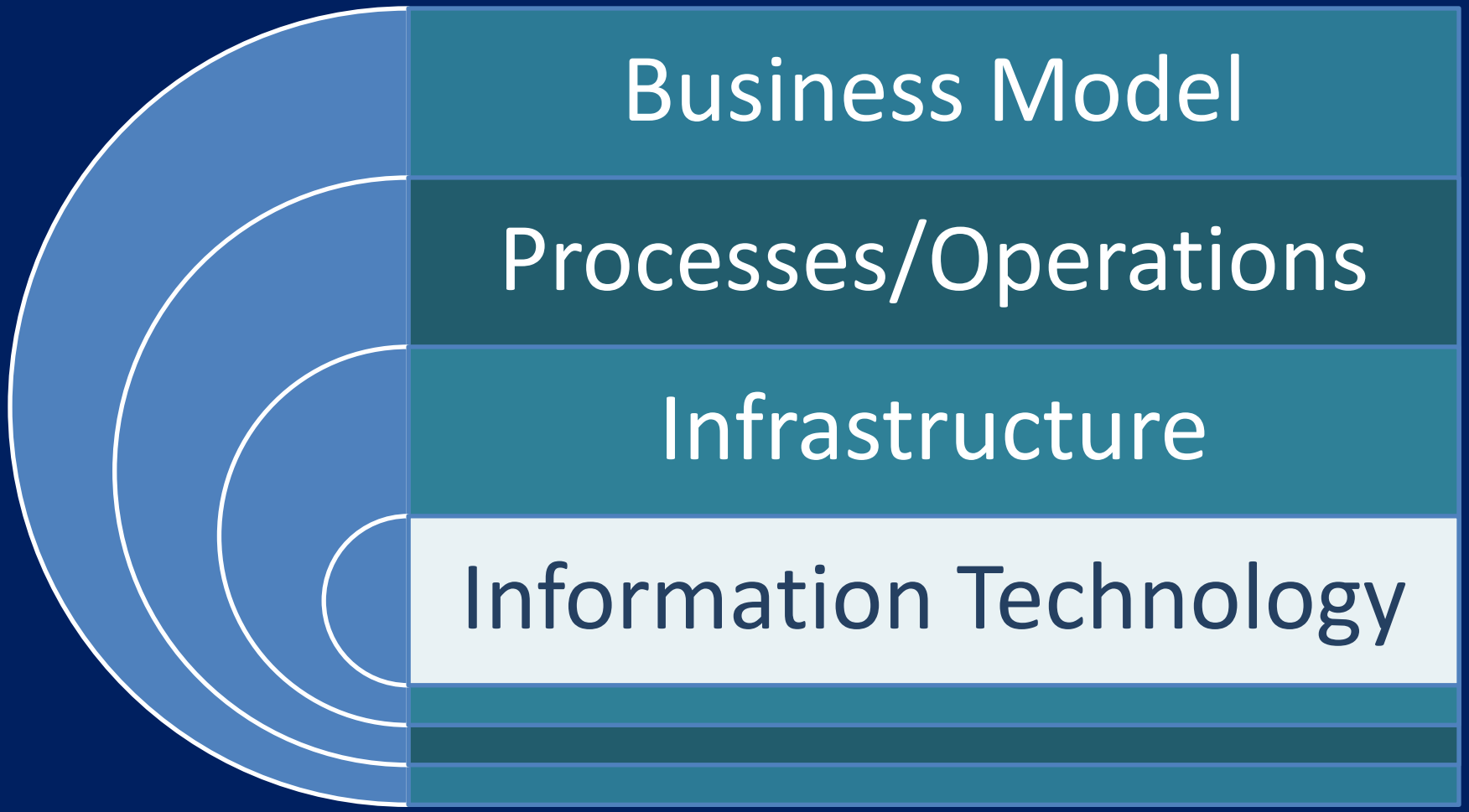


CC Initiatives affect the Enterprise

- Internal Organization and Stakeholders
- External Stakeholders
- Partners/ Suppliers/ Service Providers
- Facilities and Locations
- Service Dependencies
- Customer Commitments



CC is part of a larger Enterprise Context



Planning a CC Initiative

- Problem Side Analysis
- Analysis of Alternatives (AoA)
- Analysis of Impact on Current Operations
- Overcome Weaknesses
- Exploit Opportunities
- Making Solution Side Decisions

Zero Time

- Instant Adaptation
- Instant Involvement
- Instant Execution
- Instant Value Alignment
- Instant Learning
- Achieving three creates a market leader.
- Achieving all five leads to perpetual market lock.

EA is a Planning Discipline

- Frames the Problem Side
- Reflects Concerns from Multiple Viewpoints
- Provides Standard Analysis Patterns
- Provides a Knowledgebase for Decision Making
- Reflects the tradeoffs that must be made during Planning

Contrast EA vs. Engineering

- Defining detailed requirements
- Making design space tradeoffs
- Make vs Buy Decisions
- Definition of solution architecture
- Design of Solution
- Acquisition/Development of Solution
- Deployment of Solution

EA Planning Delivers

- A Collection of related IT and business Projects
- A Roadmap that recognizes Project Dependencies
- Each Project develops IT/Business Capabilities
- IT/Business Capabilities support Operations explicitly
- A Roadmap balances risks against aggressive evolution
- A Roadmap incorporates resource related tradeoffs and prioritizations

Some EA Terminology

- Enterprise Patterns
- Enterprise Architecture Frameworks
- Enterprise Viewpoints/Concerns
- Enterprise Views/Models
- Enterprise Initiatives

Patterns (Simple View)

- Metaphors that are generally applicable to a class of problems, solutions, methods, techniques, etc. (Models)
- Patterns are reusable
- Patterns inform methods and techniques
- Patterns provide “large granularity knowledge”
- Pattern deviations create both opportunity and confusion

Enterprise Patterns

- Enterprise Classification schemes
  - Federal Budget Spending Category Codes (OMB)
  - North American Industrial Standard Codes (NAICS)
  - Standard Industry Codes (SIC)
  - IRS Business Taxpayer Classifications
  - Fortune 500 Corporation Classification
  - Standard & Poor Classification
  - Many Others

Using Enterprise Patterns

- Benchmarking Cloud Adoption
- Determining Competitive Advantage
- Determining Cloud Adoption Pressures
- Determining Stance: Follow or Lead

What Market am I In? Who is similar to me?

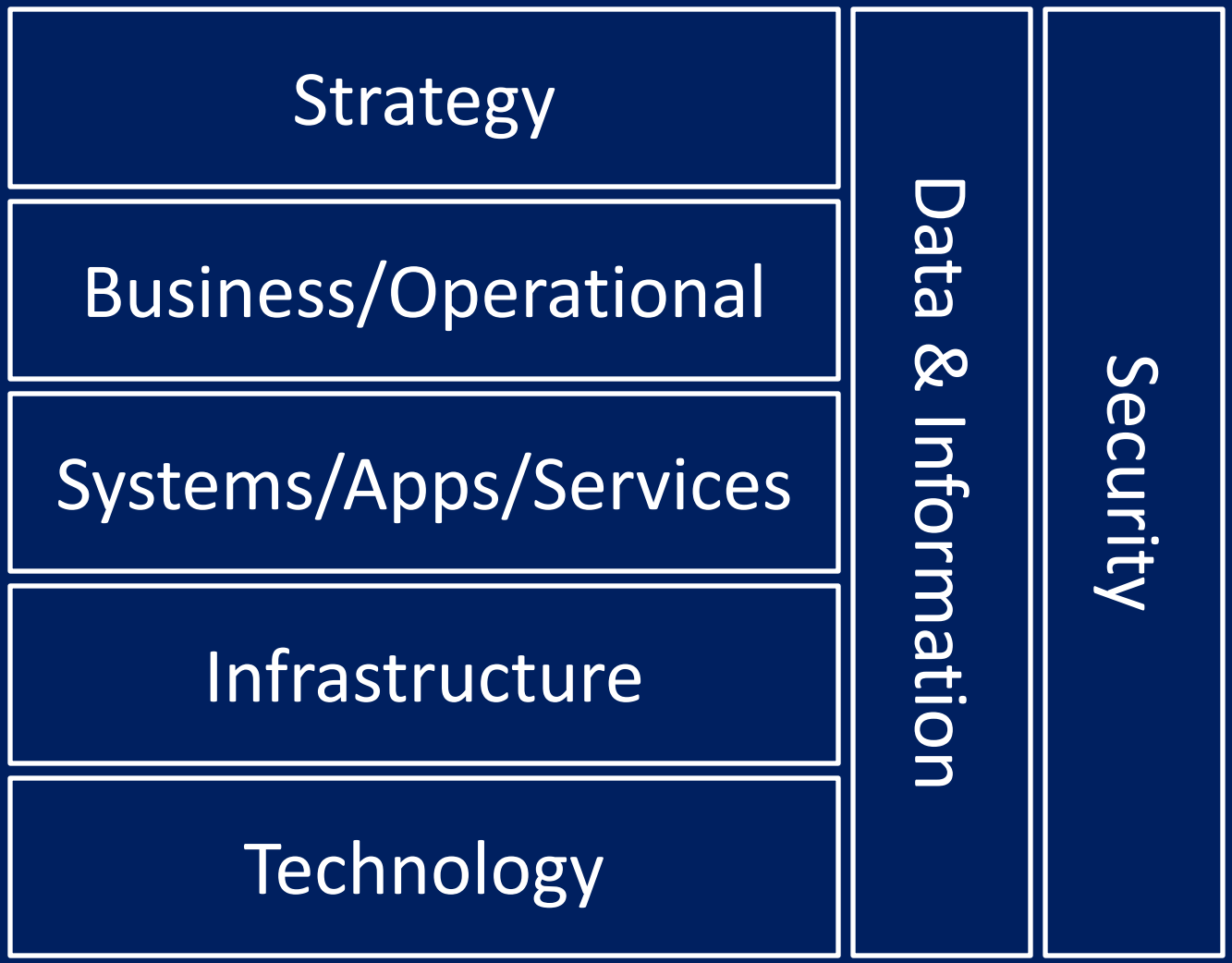
Architecture Framework Patterns

- Taxonomy/Ontology Based Frameworks
  - Zachman Framework
  - IDEAS and DM2
- Process Based Frameworks
  - TOGAF/ADM
  - EAP
- Hybrid Frameworks
  - New FEAF Common Approach
  - DoDAF/NAF/MODAF

Architecture Framework

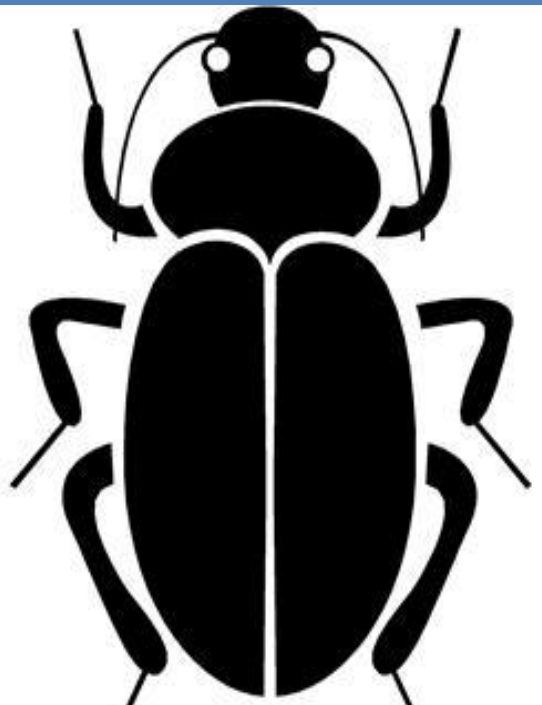
- Multiple Viewpoints/Concerns
- Multiple Views (Models)/Representations
- (Standard Architecture Elements) represent
  - What
  - How
  - Who
  - Where
  - When
  - Why

Viewpoint Patterns



Why is Viewpoint Important?

Programmer's View

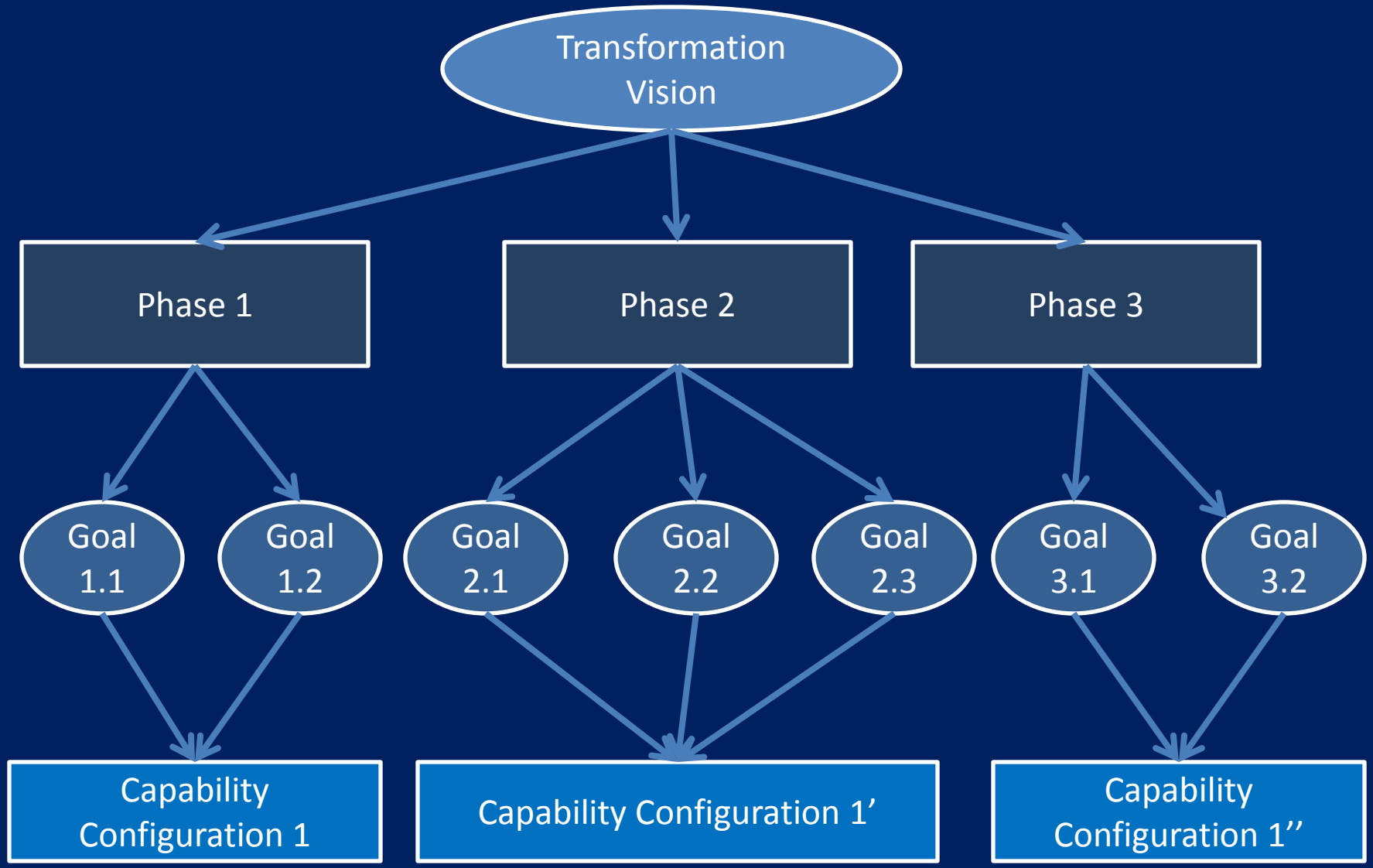


Customer's View

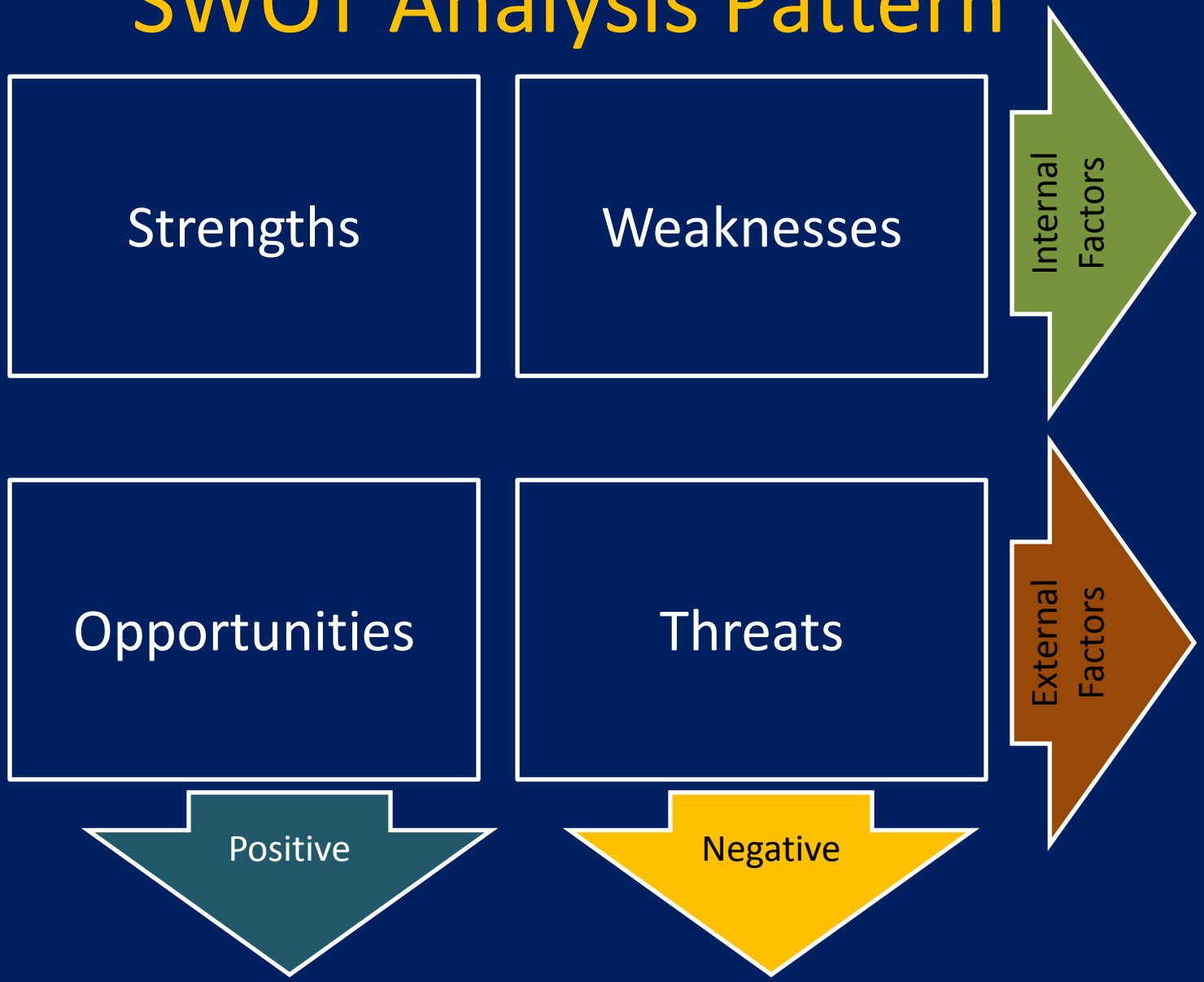
Sample Strategic Viewpoint Patterns

DoDAF	TOGAF	Common Approach
CV-1 Vision	Driver/ Goal/ Objective Catalog	S-1 Concept Overview Diagram
CV-2 Capability Taxonomy		S-2 Strategic Plan
CV-3 Capability Phasing		S-3 CONOPS Scenarios
CV-4 Capability Dependency		S-4 SWOT Analysis
CV-5		S-5 Performance Measures Scorecard
CV-6 Capability X Operational Activity		
CV-7 Capability X Services		

Sample CV-1 Vision Pattern



SWOT Analysis Pattern



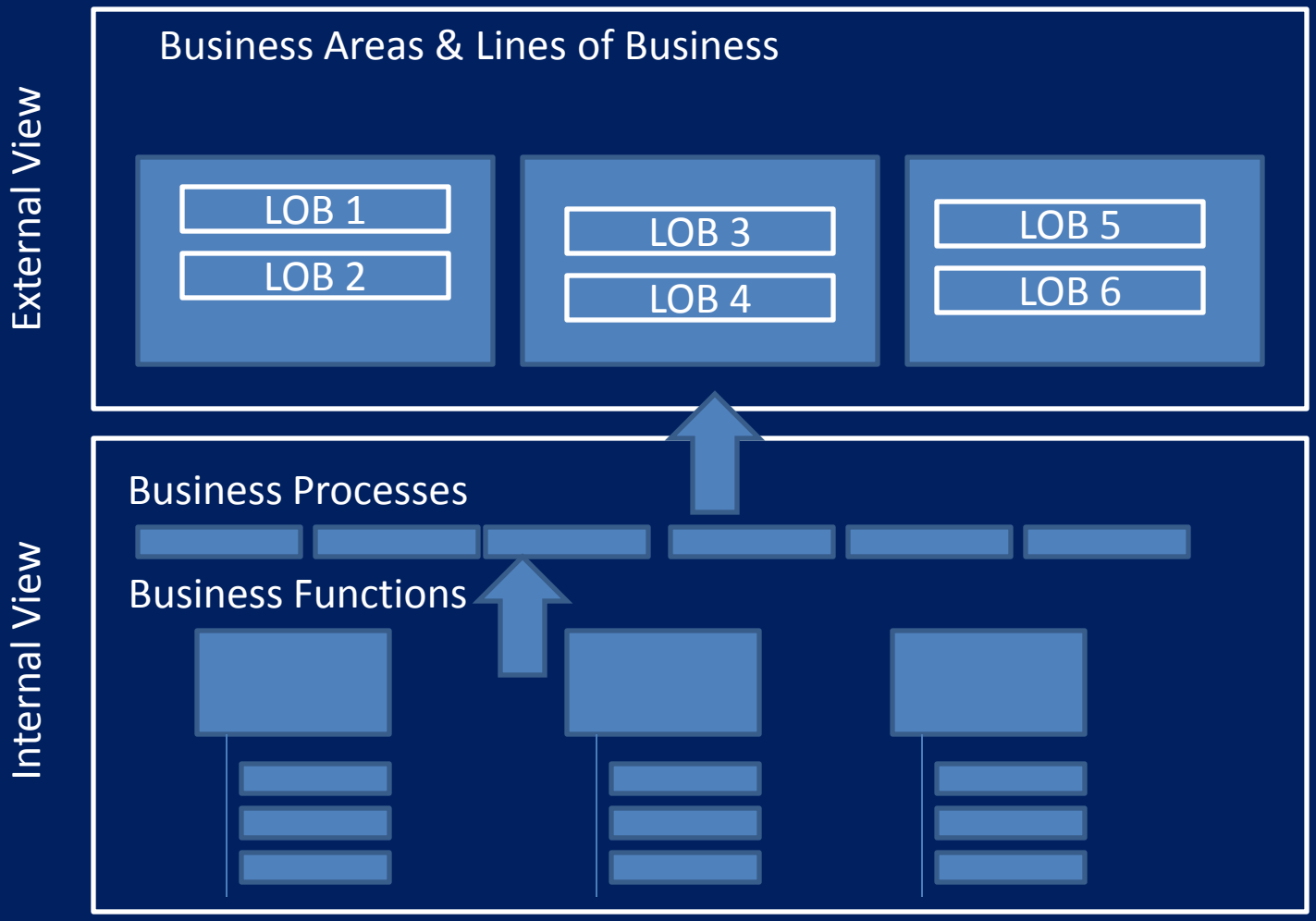
Use of Strategic View Patterns

- Surfacing Opportunities created by Cloud Technology
- Addressing Weaknesses including Capability Gaps using Cloud Technology
- Orchestrating Capability Developments and Project of Projects for Cloud Deployments
- Balancing initiatives against multiple enterprise concerns (BSC). [Ackoff's Mess]

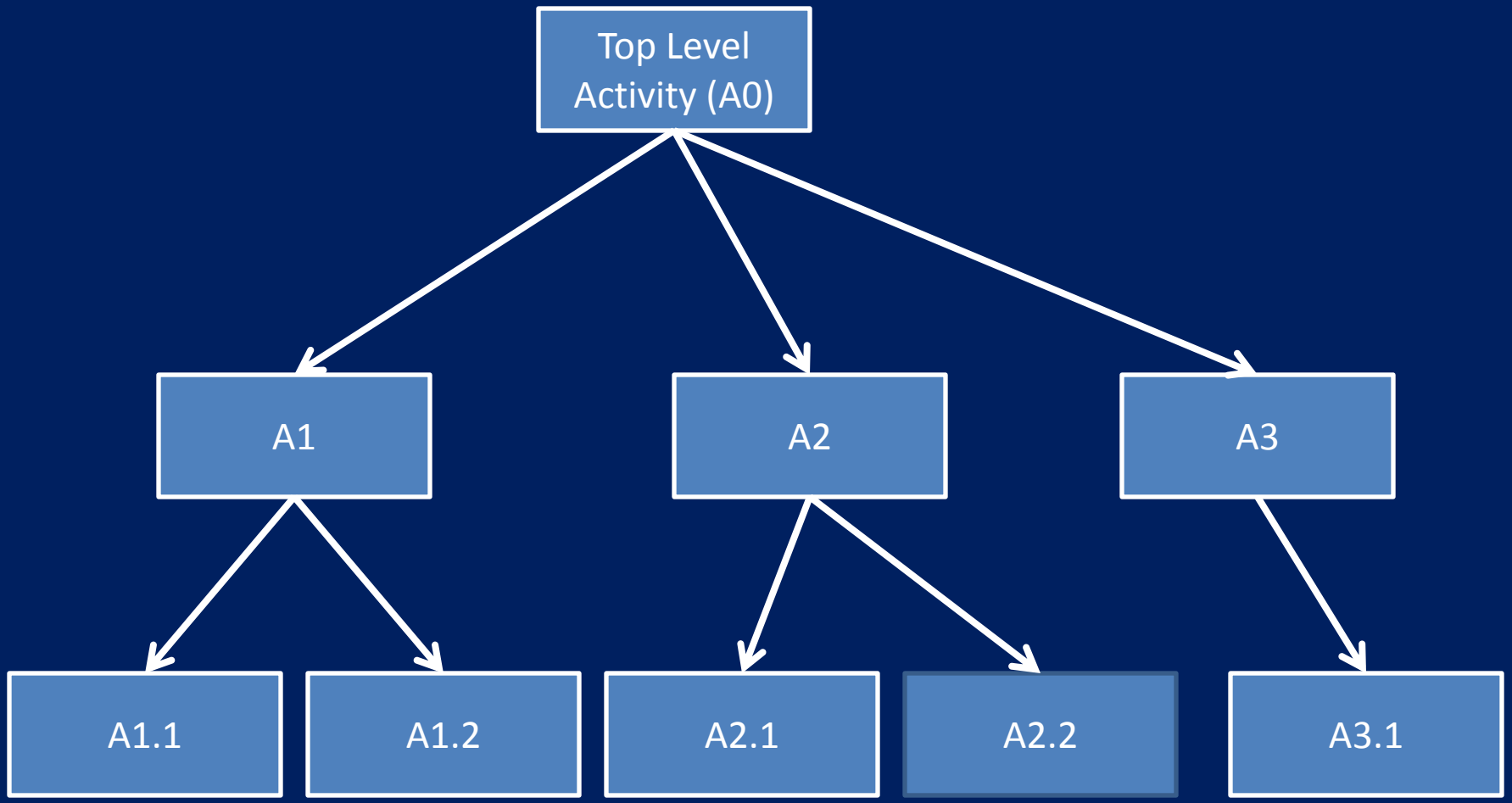
Sample Business/Operational Viewpoint Patterns

DoDAF	TOGAF	Common Approach
OV-1 Operational Concept Graphic	Organization/Actor Catalog	B-1 Business Process Diagram
OV-2 Operational Resource Flow Diagram	Role Catalog	B-2 Business Operating Plan
OV-3 Operational Resource Flow Matrix	Business/Service/ Function Catalog	B-3 Business Service Catalog
OV-4 Organizational Relationships	Location Catalog	B-4 Organization Chart
OV-5a,b Activity Model	Process/ Event/ Control/ Product Catalog	B-5 Use Case Narrative and Diagram
OV-6a,b,c Behavior Models	Contract/Measure Catalog	B-6 Business Case/Alternative Analysis

Business Reference Model Pattern

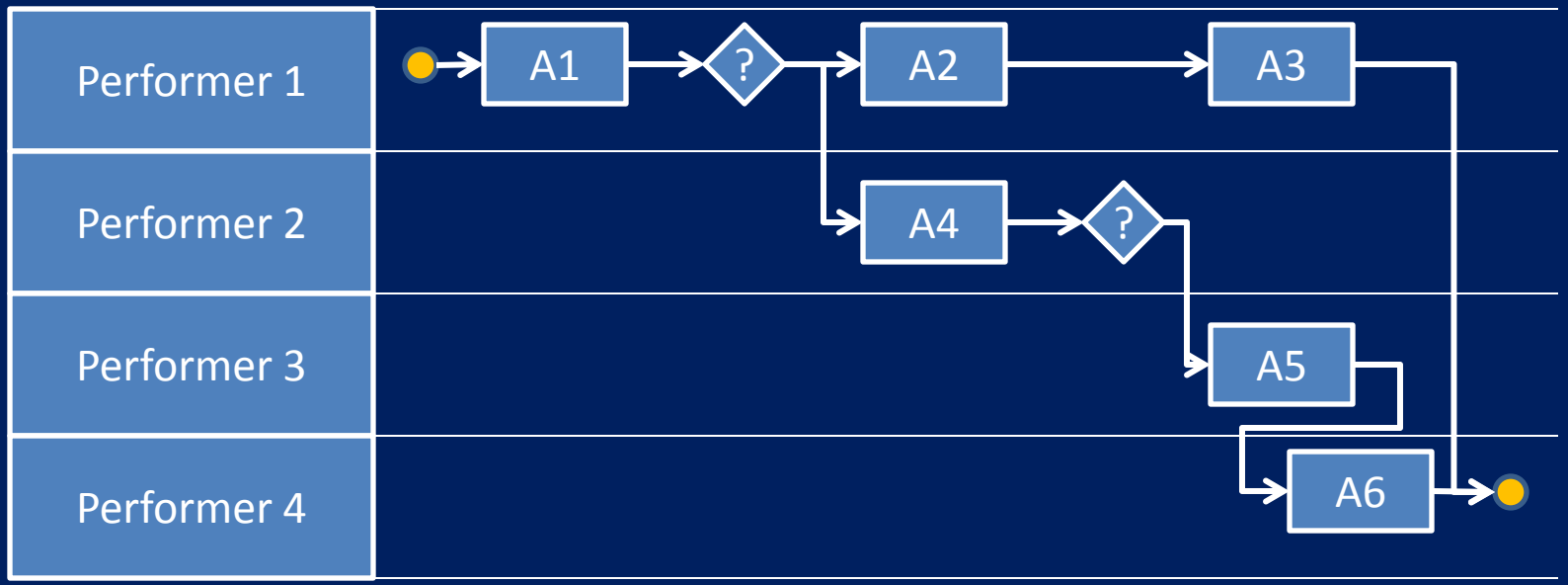


Sample OV-5a Pattern



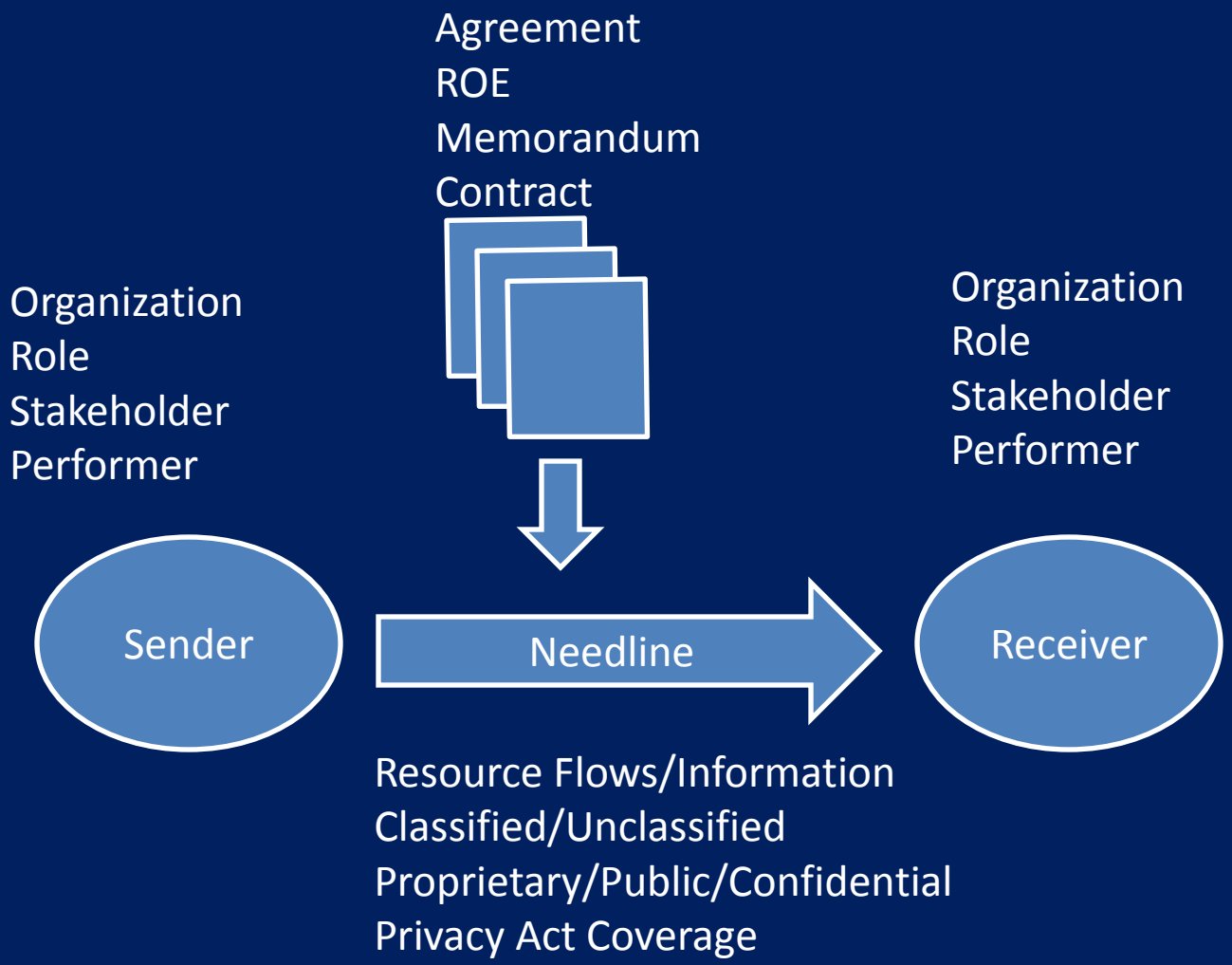
Fractal Pattern

Cross Functional Process Model Pattern



Fractal Pattern

Sample Resource Flow Pattern



Fractal Pattern

Use of Business/Operational View Patterns

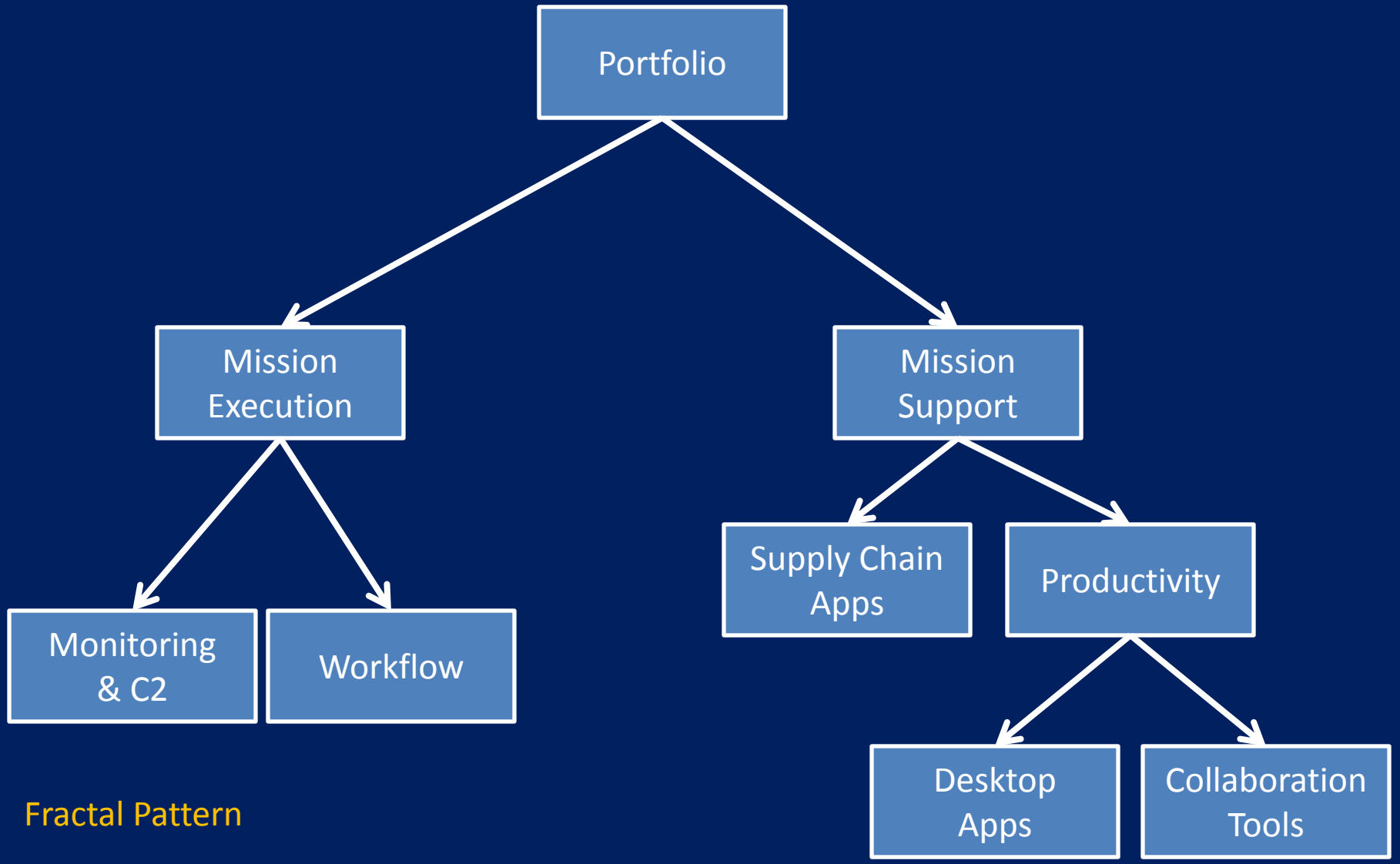
Understanding

- Operational Information Flows
- Business Process & Activity Coupling
- Organizational Involvement & Responsibility
- Process X IT Relationships
- Inform Cloud Partitioning and Cloud Style decisions

Sample Systems/App/Service Viewpoint Patterns

DoDAF	TOGAF	Common Approach
SV-1 Systems Interfaces	Application Portfolio Catalog	A-1 Application Interface Diagram
SV-2 Systems Connectivity	Application X Organization Matrix	A-2 Application Communication Diagram
SV-3 System X System Matrix	Role/ Application Matrix	A-3 Application Interface Matrix
SV-4 Systems Functionality	Application/ Function Matrix	A-4 Application Data Exchange Matrix
SV-5 System Function X Operational Activity	Application Interaction Matrix	A-5 Application Service Matrix
SV-6 Systems Data Exchange	Process/ Application Realization Diagram	A-6 App

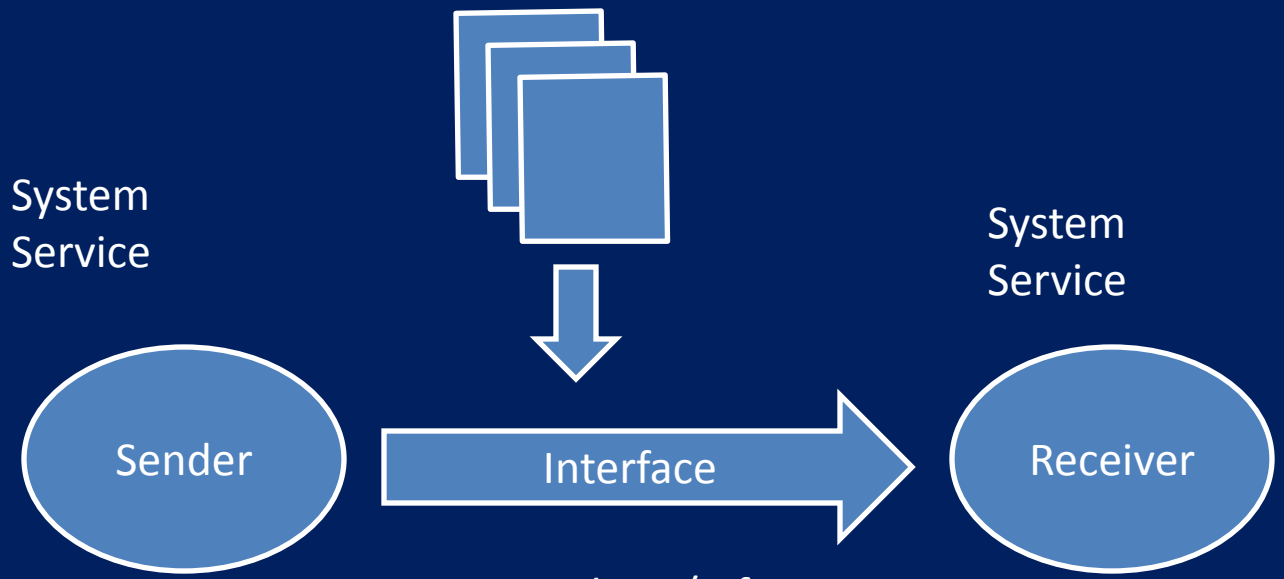
Sample Portfolio Pattern



Fractal Pattern

Sample System Resource Flow Pattern

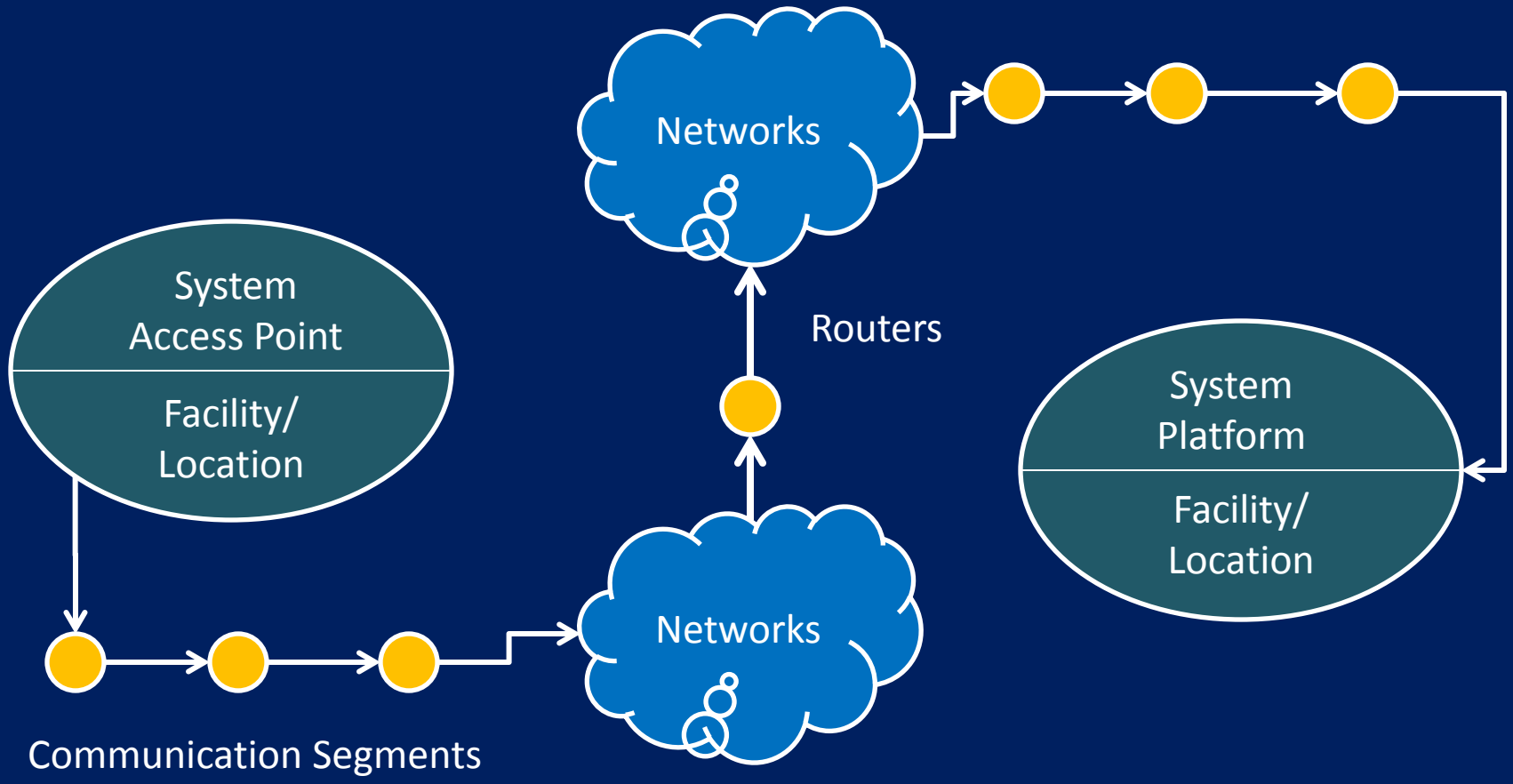
Interface Agreement
ICD/IDD



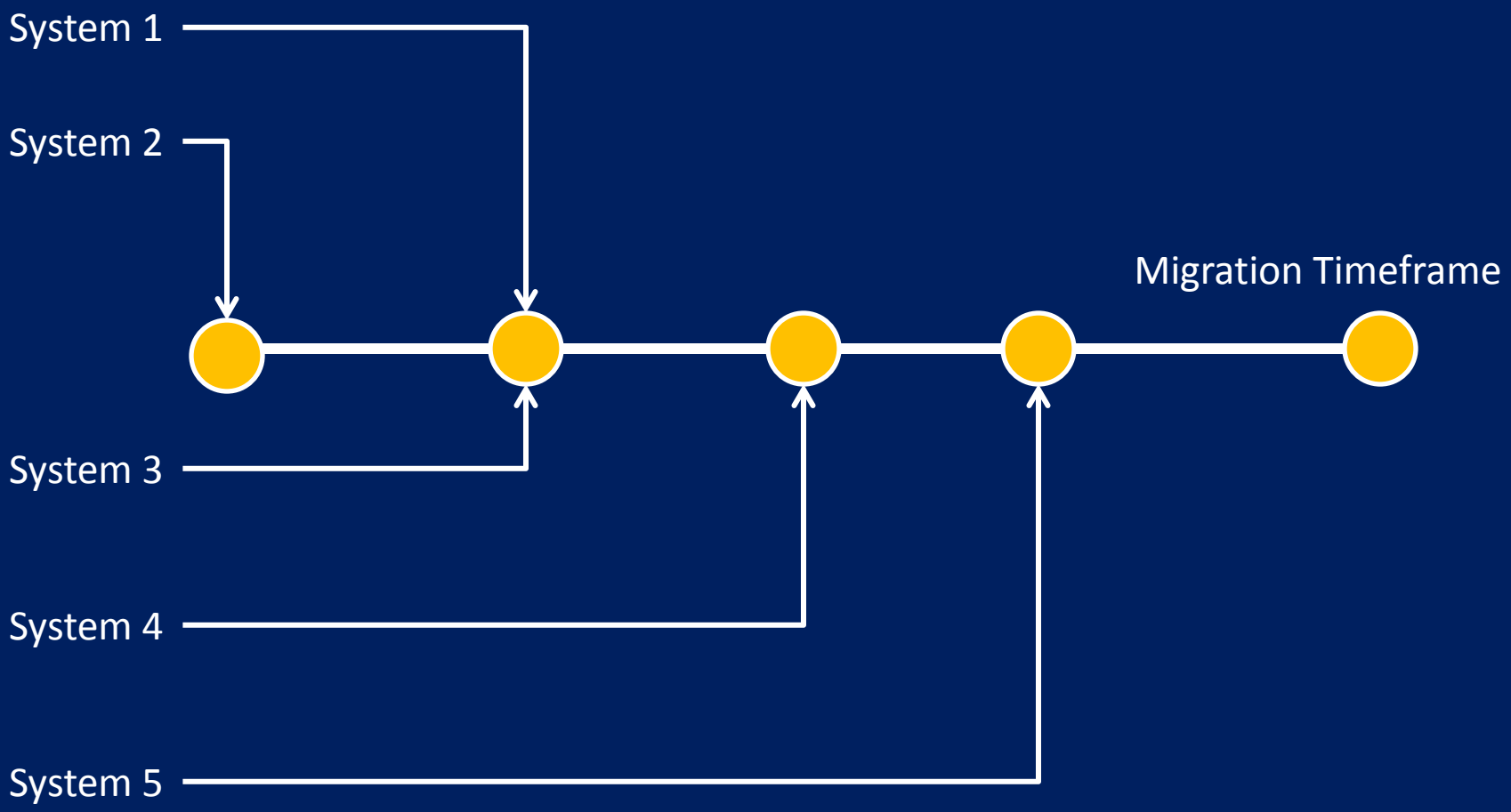
Resource Flows/Information
Classified/Unclassified
Proprietary/Public/Confidential
Privacy Act Coverage
Message Standard
Semantic Model

Fractal Pattern

Sample Connectivity Pattern



System Migration Pattern



Use of Systems/App/Service Viewpoint Patterns

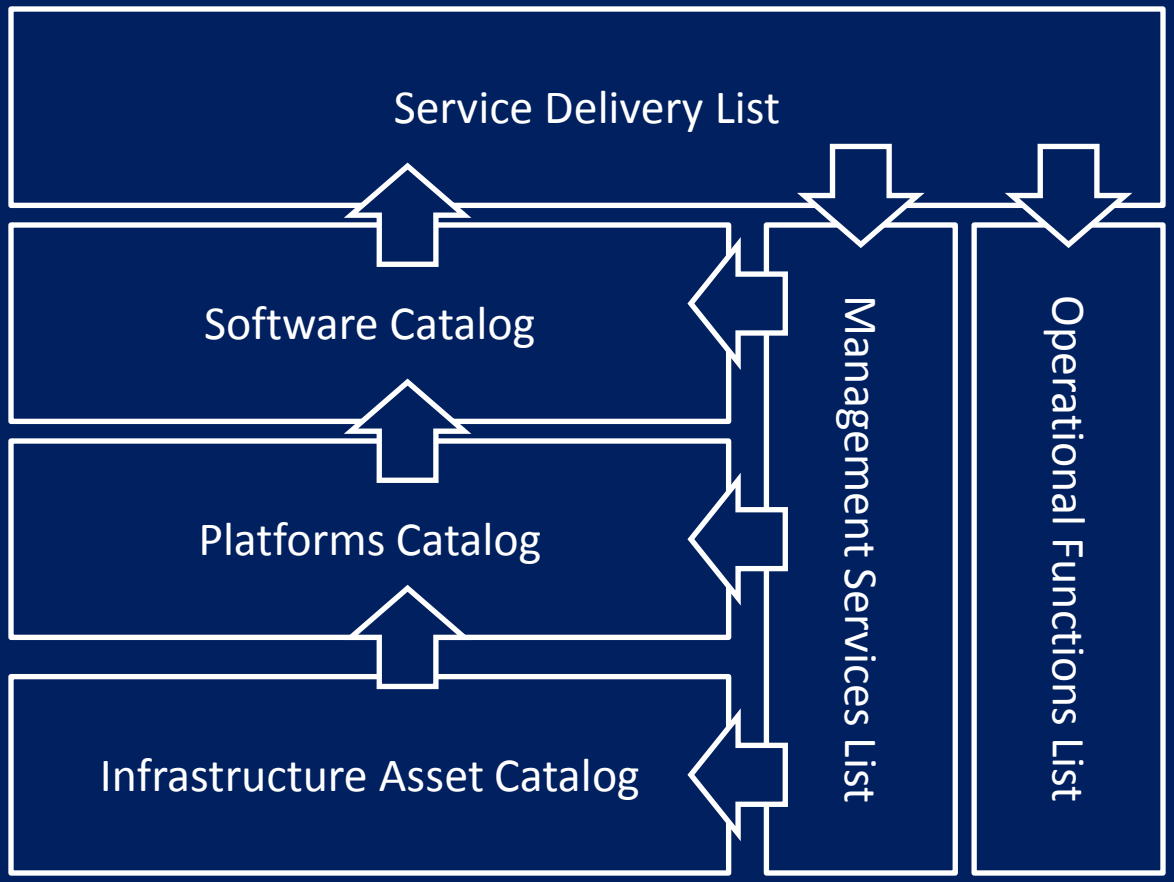
Understanding

- System Portfolios
- Systems Interfaces & Connectivity
- Systems Use of Platforms
- Systems Evolution – Functionality & Technology
- Inform Cloud Migration Roadmap Decisions

Sample Infrastructure Viewpoint Patterns

DoDAF	TOGAF	Common Approach
SvcV-1 Service Interface s	Enterprise Manageability Diagram	Network Diagram
SvcV-2 Service Resource Flows	Process/Application Realization Diagram	Hosting Concept of Operations
SvcV-9 Service Technology Evolution	Software Engineering Diagram	Technical Standards Profile
StdV-1 Standards Profile	Application Migration Diagram	Cable Plant Diagram
SV-9 Systems Technology Evolution	Software Distribution Diagram	Wireless Connectivity Diagram
		Data Center/Server Room Diagram

Sample Infrastructure Pattern



Adapted from Dynamic Data Center Reference Model
Wilfried Schadenboeck

Use of Infrastructure Viewpoint Patterns

Understanding

- Platforms
- Datacenters/Facilities
- Networks and Communication Links
- Technology Standards
- IT Assets
- Inform Cloud Target Setting and Consolidation decisions

Sample Data & Information Viewpoint Patterns

DoDAF	TOGAF	Common Approach
DIV-1 Conceptual Data Model	Data Entity/ Data Component Catalog	D-1 Logical Data Model
DIV-2 Logical Data Model	Data Entity/ Business Function Matrix	D-2 Knowledge Management Plan
DIV-3 Physical Data Model	Application/ Data Matrix	D-3 Data Quality Plan
OV-3 Operational Information Exchange Matrix	Conceptual Data Diagram	D-4 Data Flow Diagram
SV-4 Systems Data Flow Diagram	Logical Data Diagram	D-5 Physical Data Model
SV-10c Systems Event Trace Diagram	Data Lifecycle Diagram	D-6 CRUD Matrix

Use of Data & Information Viewpoint Patterns

Understanding

- Distribution of Data across the Enterprise
- Issues of Data Security
- Issues of Data Ownership
- Issues of Data Privacy
- Issues of Data Stewardship and Quality
- Inform the data strategy for Cloud Migration and expose data related risk and vulnerability

Sample Security Viewpoint Patterns

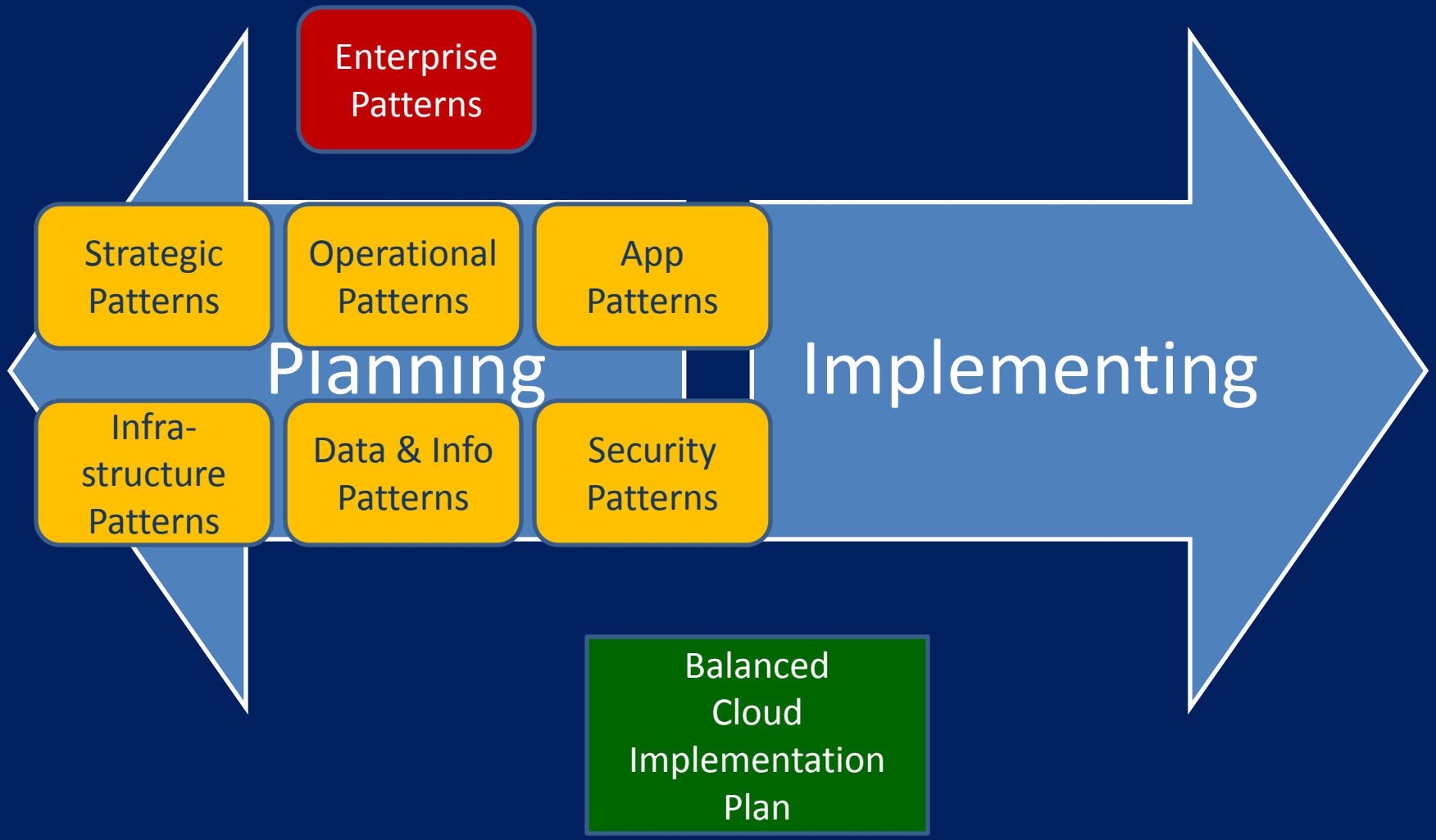
DoDAF	TOGAF	Common Approach
OV-6a Operational Rules Model	Role catalog	Security Controls Catalog
SV-10a System Rules Model	Organization/Role Catalog	Security & Privacy Plan
SV-7 Systems Measures Matrix	Actor/Role Matrix	Certification & Accreditation Documentation
	Contract/Measure Catalog	Continuous Monitoring Procedures
	Data Dissemination Diagram	Disaster Recovery Plan
	Data Security Diagram	Continuity of Operations Plan

Use of Security Viewpoint Patterns

Understanding

- Information Security
- Data Security
- Continuity of Operations
- Disaster Recovery
- Monitoring & Control
- Certification & Accreditation
- Informs the security strategy for the Cloud Migration

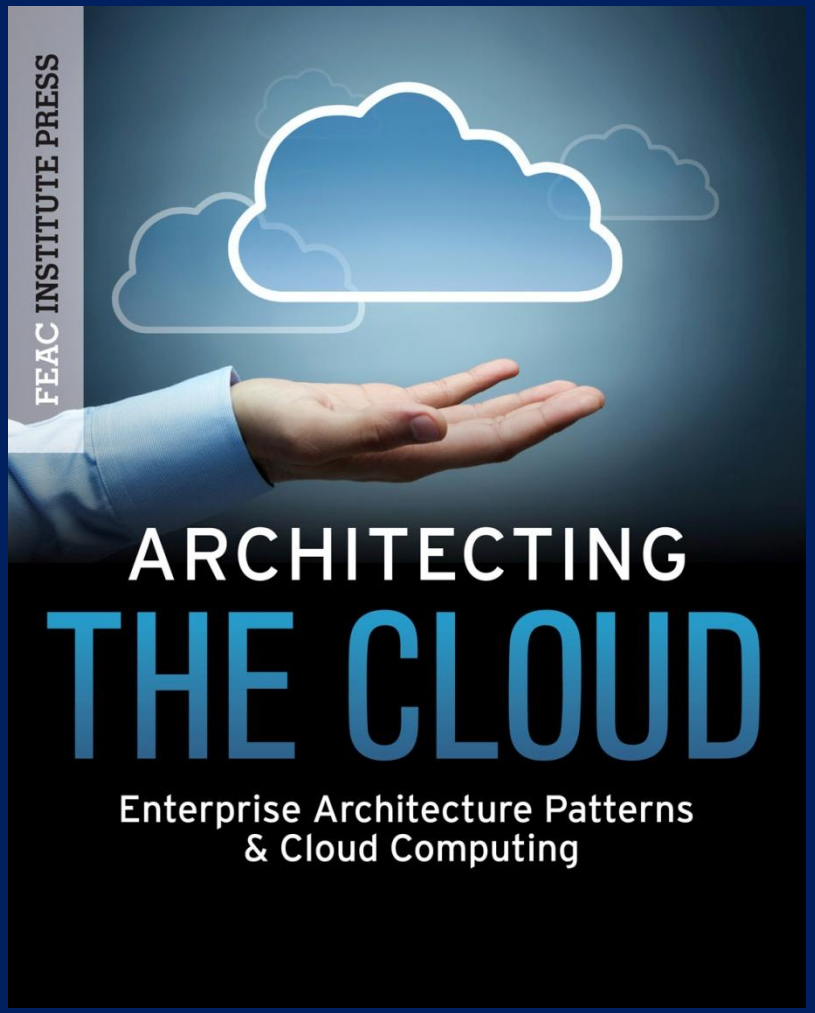
Summary: Balancing the rush to implementation



References

- TOGAF 9.1 (The Open Group)
- DoDAF 2.03 (US Department of Defense)
- FEAF 2 Common Approach (Office of Management & Budget)
- FEAC Certified Enterprise Architect CEA Study Guide (McGraw-Hill)
- and finally:

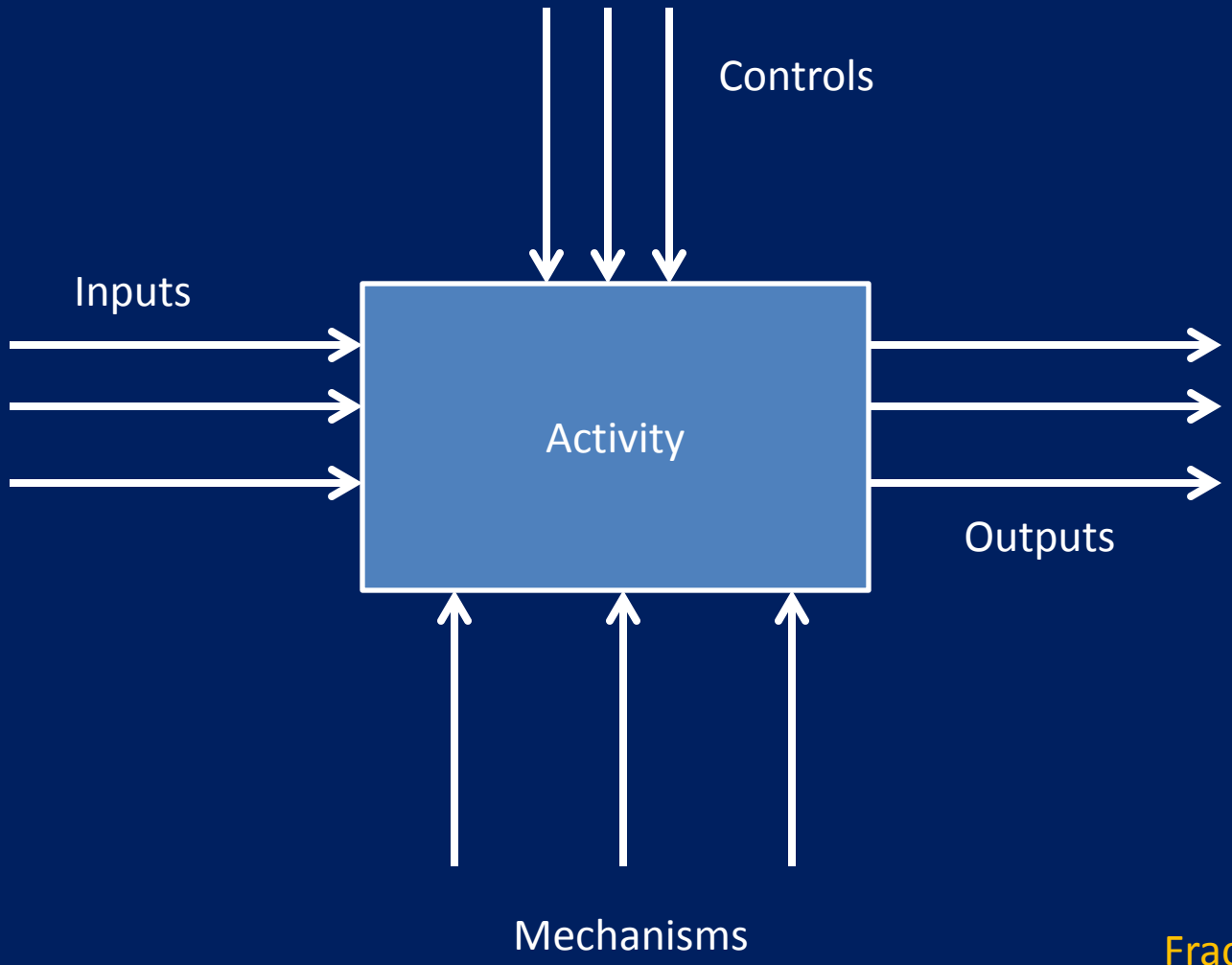
Upcoming Book (McGraw Hill)



Co-Authors:

Beryl Bellman
Mark Bergman
Alan Brenner
Kenneth Griesi
Prakash Rao
Claudia Rose

Sample Activity Context Pattern



Fractal Pattern