An Architectural Approach for Command, Coordination, and Communications Capabilities Assessment

Kristin Lee

Sheila Cane

Salwa Abdul-Rauf

Carlos E. Martinez

MITRE

Agenda

- Introduction
- Analytical Objectives
- Conceptual Model
- Analytical Framework
- Design Concepts and Implementation
- Future Work
- Conclusions

Introduction

MITRE

Introduction

- **Architecture-based methodology for analysis of operational and infrastructure gaps**
  - **Assesses how infrastructure supports enterprise activities**
  - **Focuses on information requirements and communications compatibility**
- **Federal Enterprise Architecture (FEA) Reference Models used in development**
  - **Influenced conceptual architecture model**
  - **Basis for standard terminology**

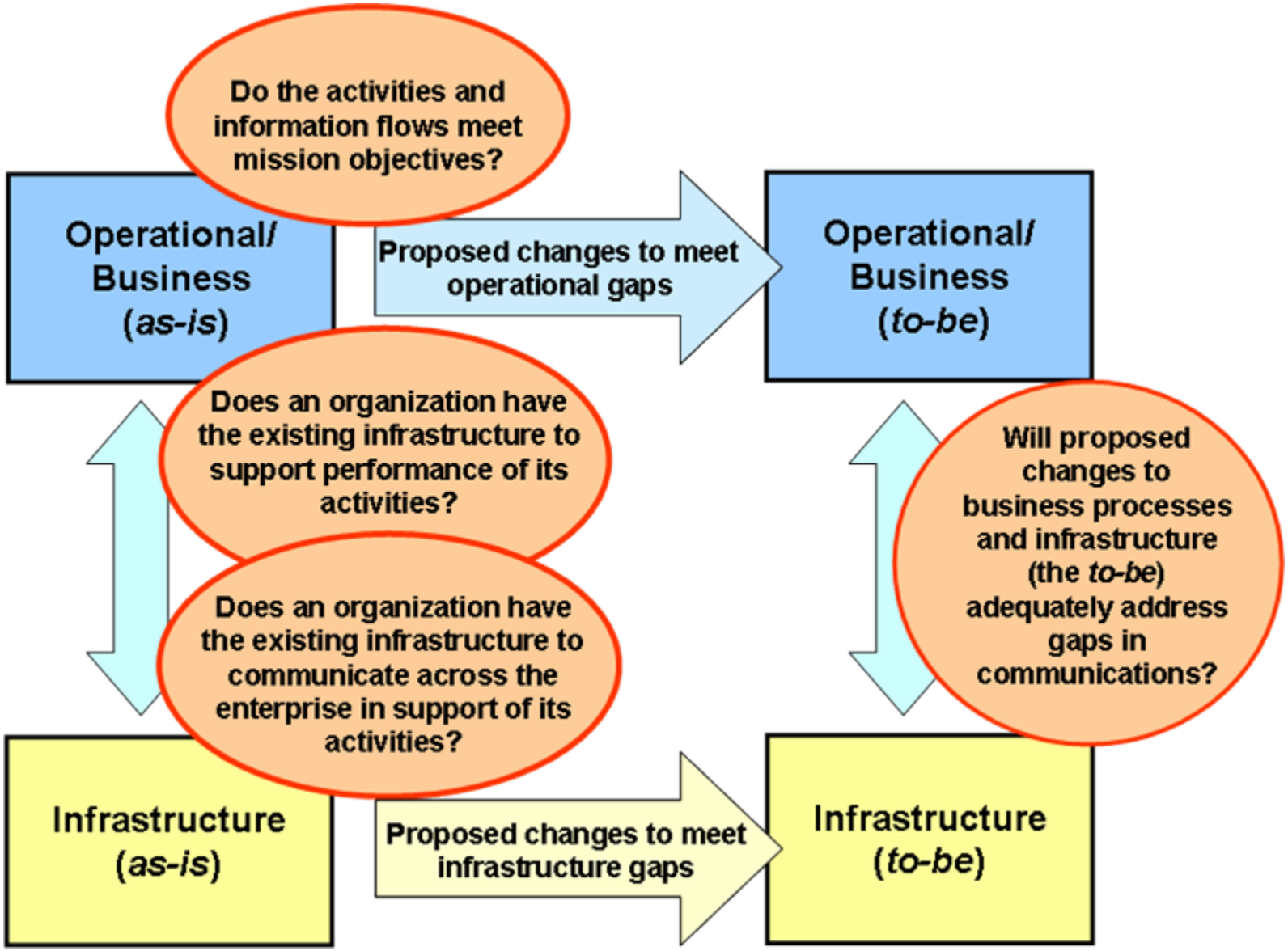
Analytical Objectives

MITRE

Analytical Objectives

- **Determine whether an organization's infrastructure can adequately support operational activities**
  - **Operational analysis determines proper functional partners and information exchanges**
  - **Infrastructure analysis identifies communications gaps**
  - **Scenario-based analysis reveals situation-dependent capability gaps**
- **Verify technical and operational recommendations address gaps**

Analytical Questions

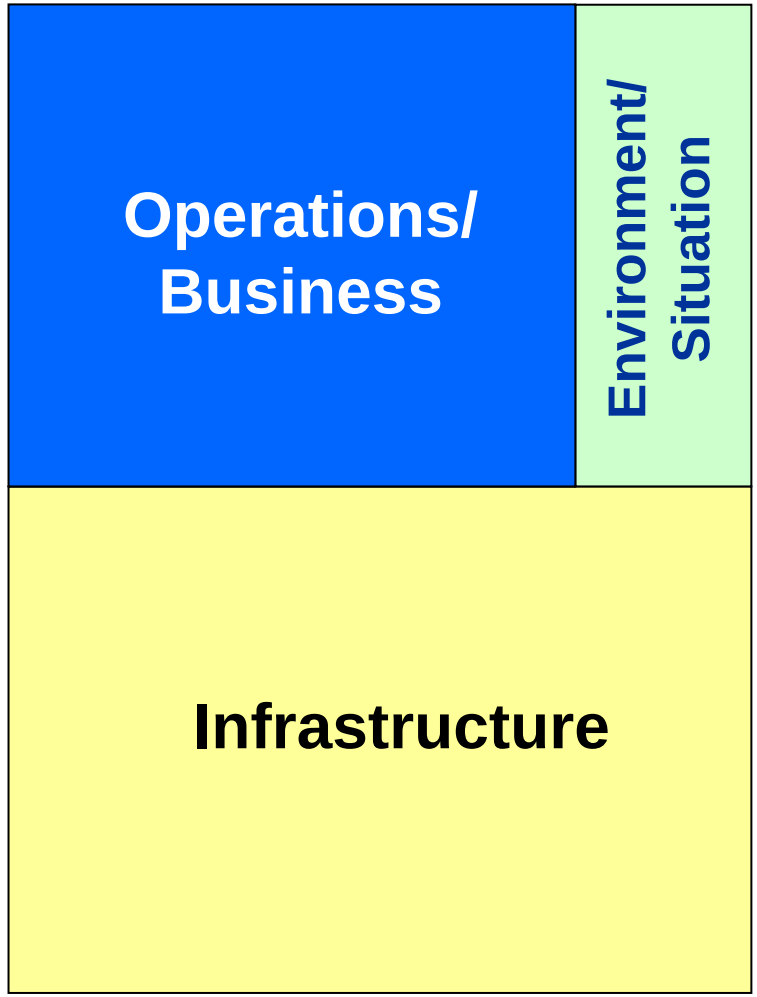


Conceptual Model

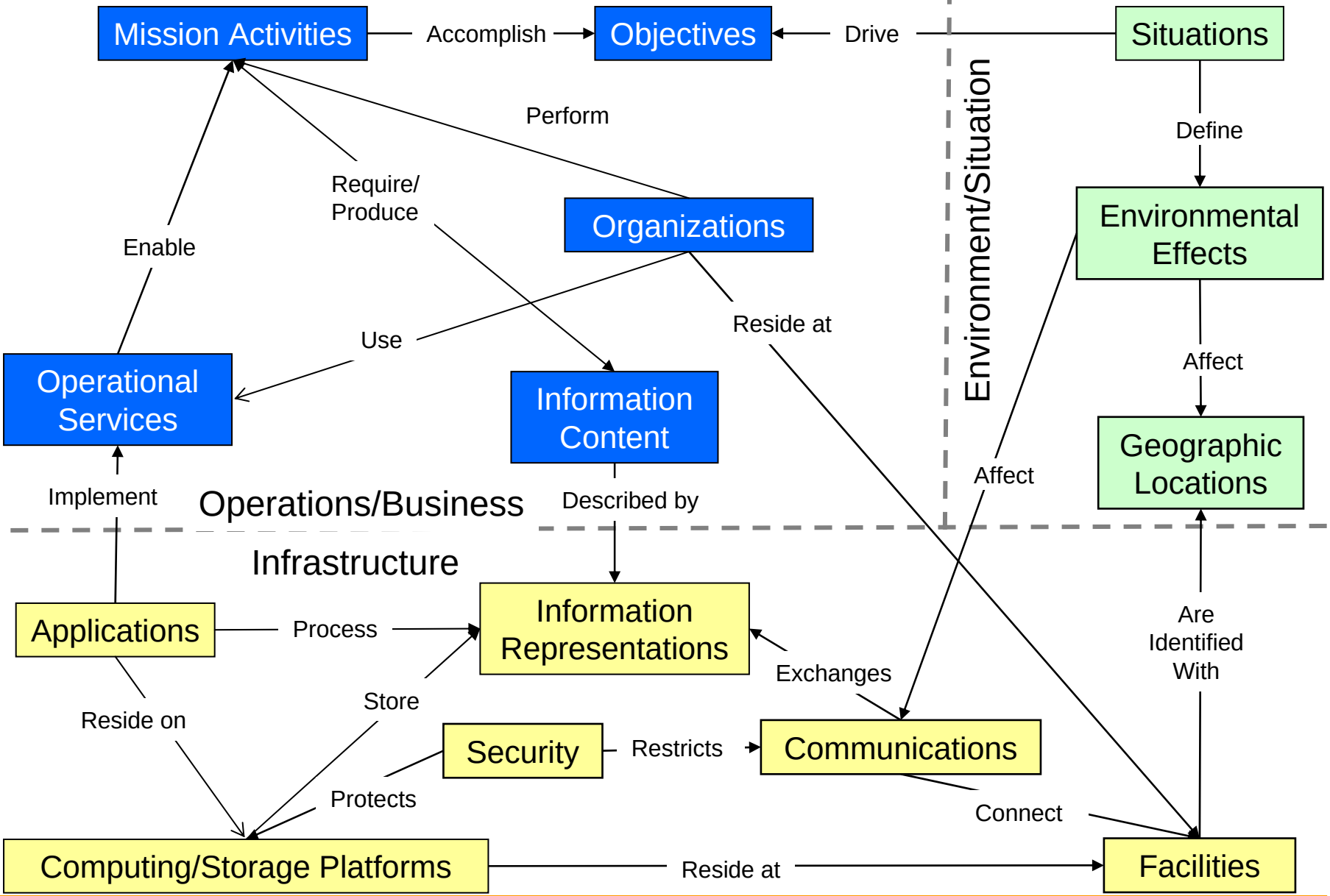
MITRE

Conceptual Model Domains

- Environment/Situation
  - The Scenarios under which organizations must operate
- Operations/Business
  - What the organization must do in any given Scenario
- Infrastructure
  - The facilities, communications systems, hardware/software, and other capabilities the organizations use to accomplish their mission activities



Conceptual Model



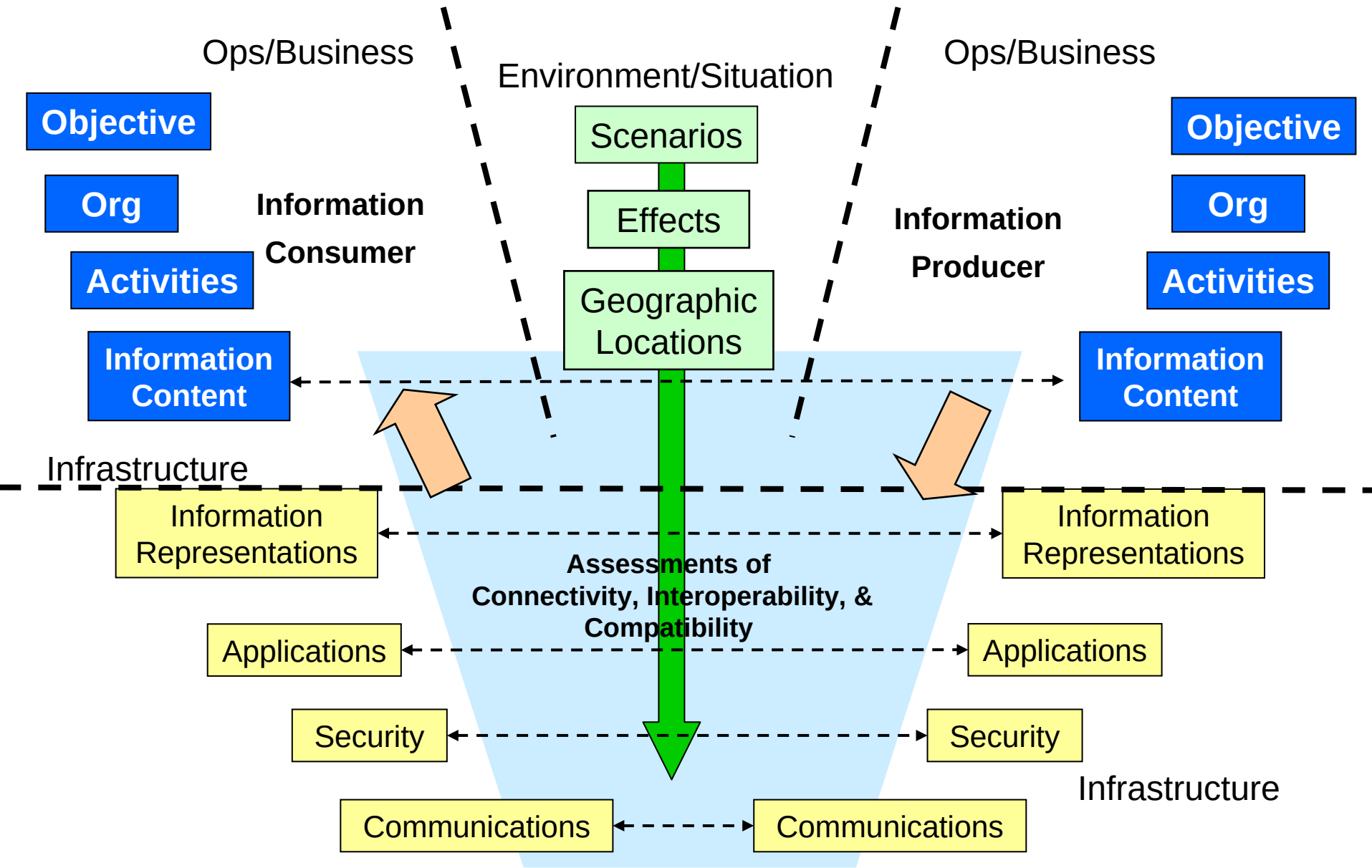
Analytical Framework

MITRE

Analytical Framework

- Defines sequential process for analysis of multi-organization operations
- Facilitates assessments of connectivity, interoperability, and compatibility of communications capabilities
- Includes situational analysis

Analytical Framework



Design Concepts and Implementation

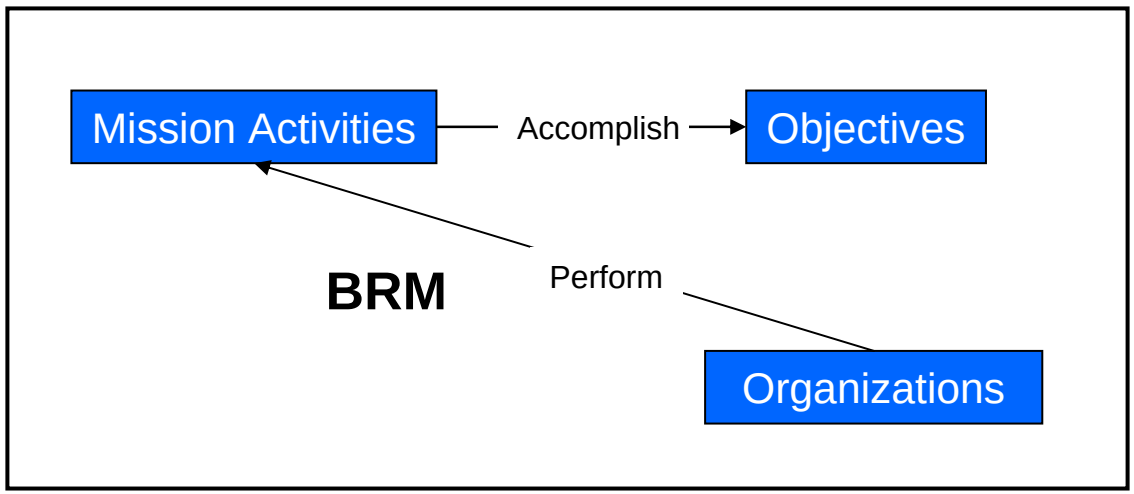
MITRE

Design Concepts

- Ensure consistency of data across multi-organization enterprise
  - Operational tables were decomposed into:
    - Essential functions, organizations, operational services and information exchanges
  - Infrastructure and communications tables were decomposed into the following domains:
    - Data networks, gateways, wireline phones, cell phones, radios, data links, satellites, faxes, applications, and VTCs
  - Use “pick lists” to ensure consistency of data elements
- Show linkages to FEA reference models
  - Business Reference Model (BRM)
  - Service Component Reference Model (SRM)
  - Data Reference Model (DRM)
  - Technical Reference Model (TRM)
  - Performance Reference Model (PRM)

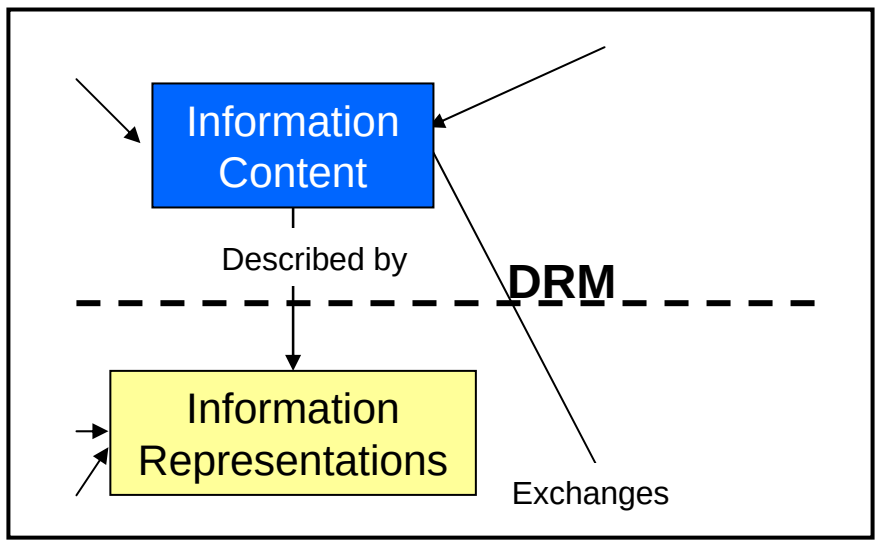
Business Reference Model

- Applies to mission activities and objectives
- Supports coverage of Federal Executive Branch (FEB) Business Areas
- Defines “Business Context” and “Subject Area” of enterprise information exchanges



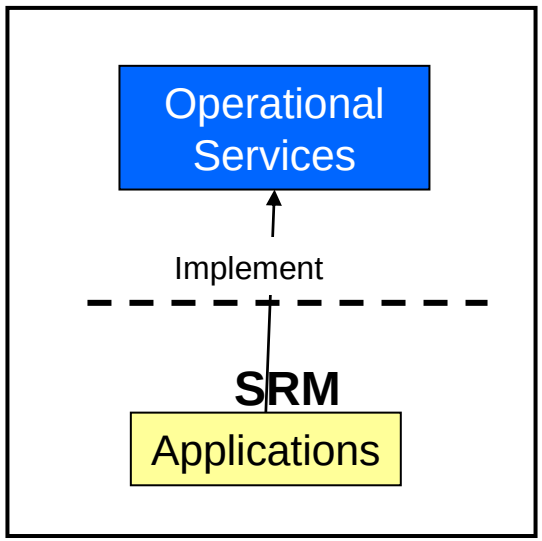
Data Reference Model

- Defines broad types of information exchange, e.g.
  - Report of facts or statistics
  - Request for authority
  - Financial transaction
- Relates information representation standards to information content



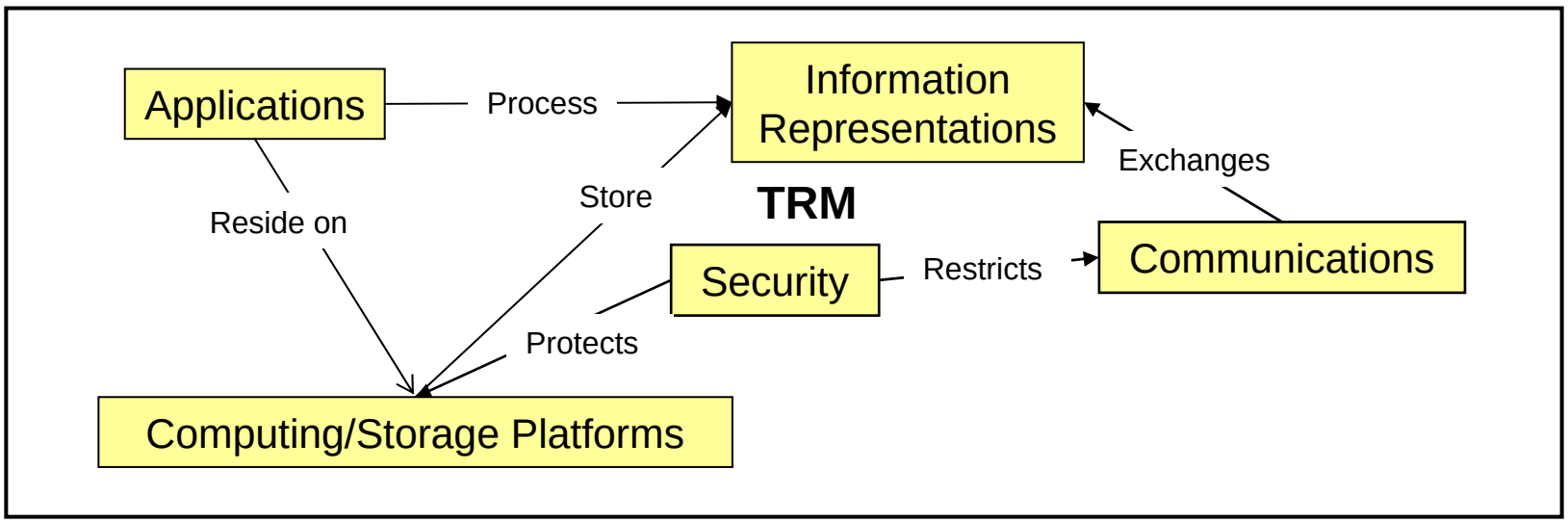
Service Component Reference Model

- Applied to both operational and technical areas
- Defined operational services
- Used as reference in development of applications-related entities



Technical Reference Model

- **Informed technical area of conceptual model**
- **Defined types of communication capabilities and related attributes**



Performance Reference Model

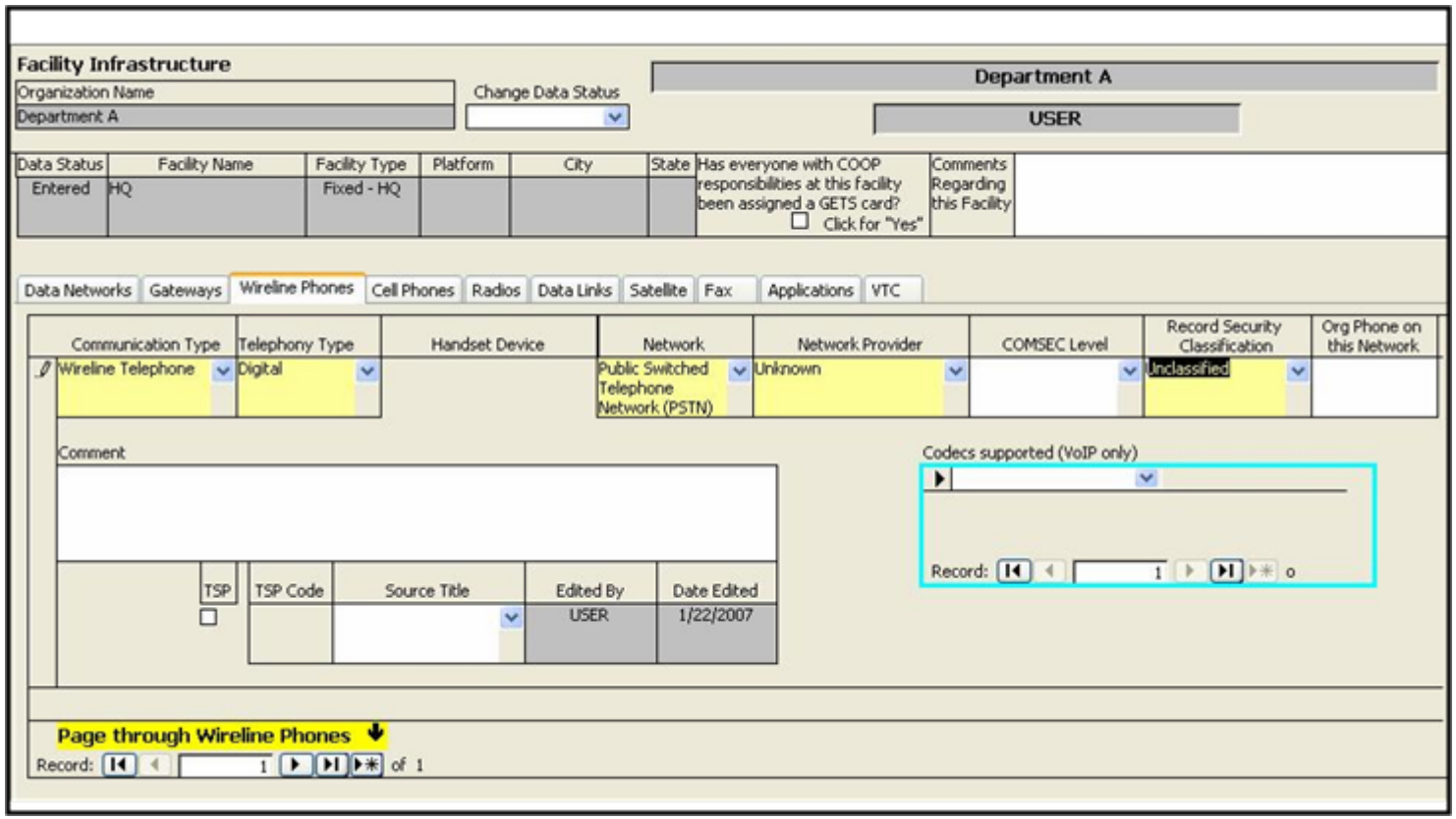
- Spans entire conceptual model
- Identifies enterprise-level metrics used to assess operational performance of mission activities

Implementation

- Selected tools for data collection and analysis
  - Analyzed tradeoffs between using an enterprise architecture tool and a relational database
  - Chose standards-based relational DBMS over COTS architecture tools
- Implemented model in an RDBMS architecture repository
  - Enables capture of all relevant enterprise data
  - Facilitates data collection
  - Supports compatibility and gap analysis objectives
- Developed a toolset to facilitate data capture and analysis
  - Menu-driven data acquisition in MS Access
  - Analytical routines using SQL Server

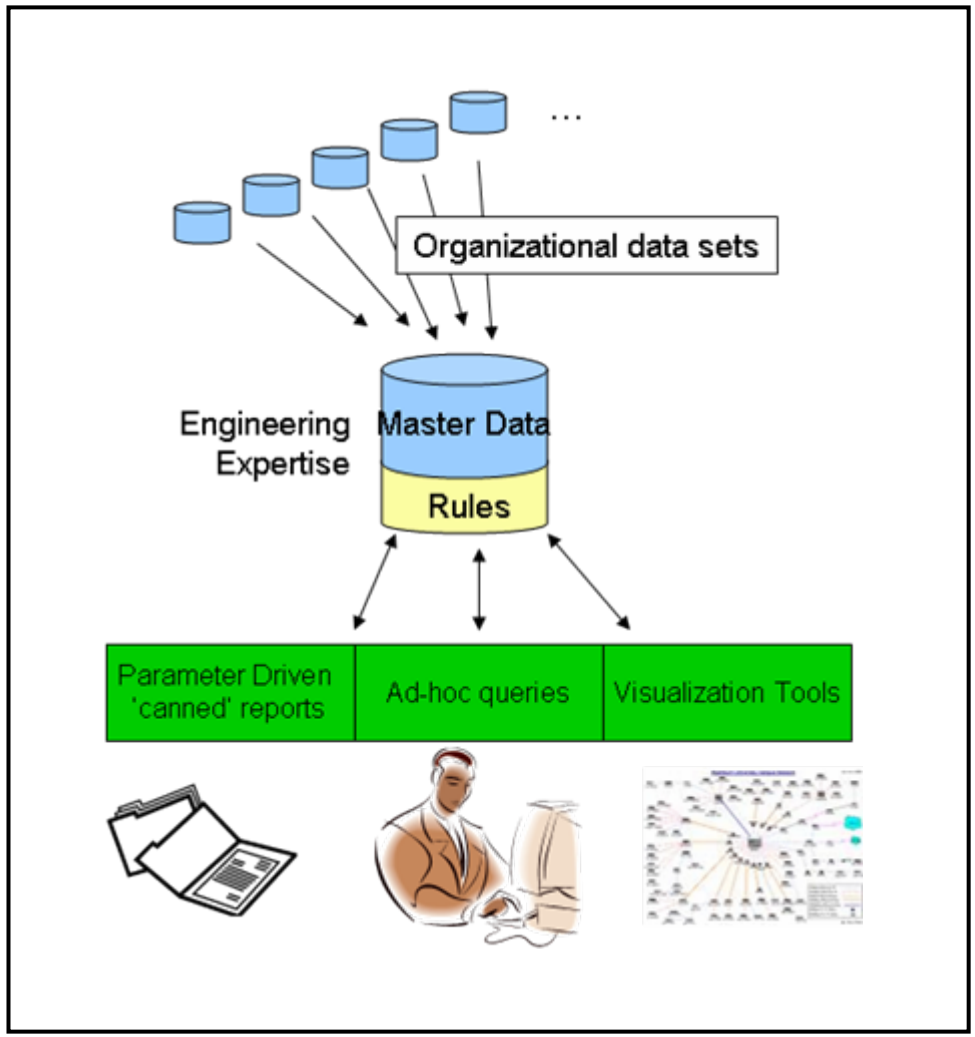
Data Acquisition Tool*

- Uses standardized terminology (pick lists)
  - Scripted user interface to facilitate data entry
  - Rapid prototype implemented in MS Access



Analytical Database*

- Prototype uses SQL Server to enable complex analysis
- Integrates data collected with MS Access data collection tool
- Provides variety of automated reports



* Part of MITRE's Multi-Enterprise Toolset for Analysis of Complex Systems (META-CS™)

Future Work

Future Work

- Extend data model to include activity sequencing to facilitate process analysis
- Expand definition of organization to include operations centers with specific skill sets

Conclusions

MITRE

Conclusions

- **Benefits of architectural approach**
  - **General analytical framework defines specific types of gaps**
  - **Analytical results can be used as input to enterprise strategic planning**
- **Use of pick lists based on FEA RMs enable data standardization**
- **Standards-based RDBMS provides open architecture**
  - **Permits program-specific data definition**
  - **Provides ability to develop custom queries**