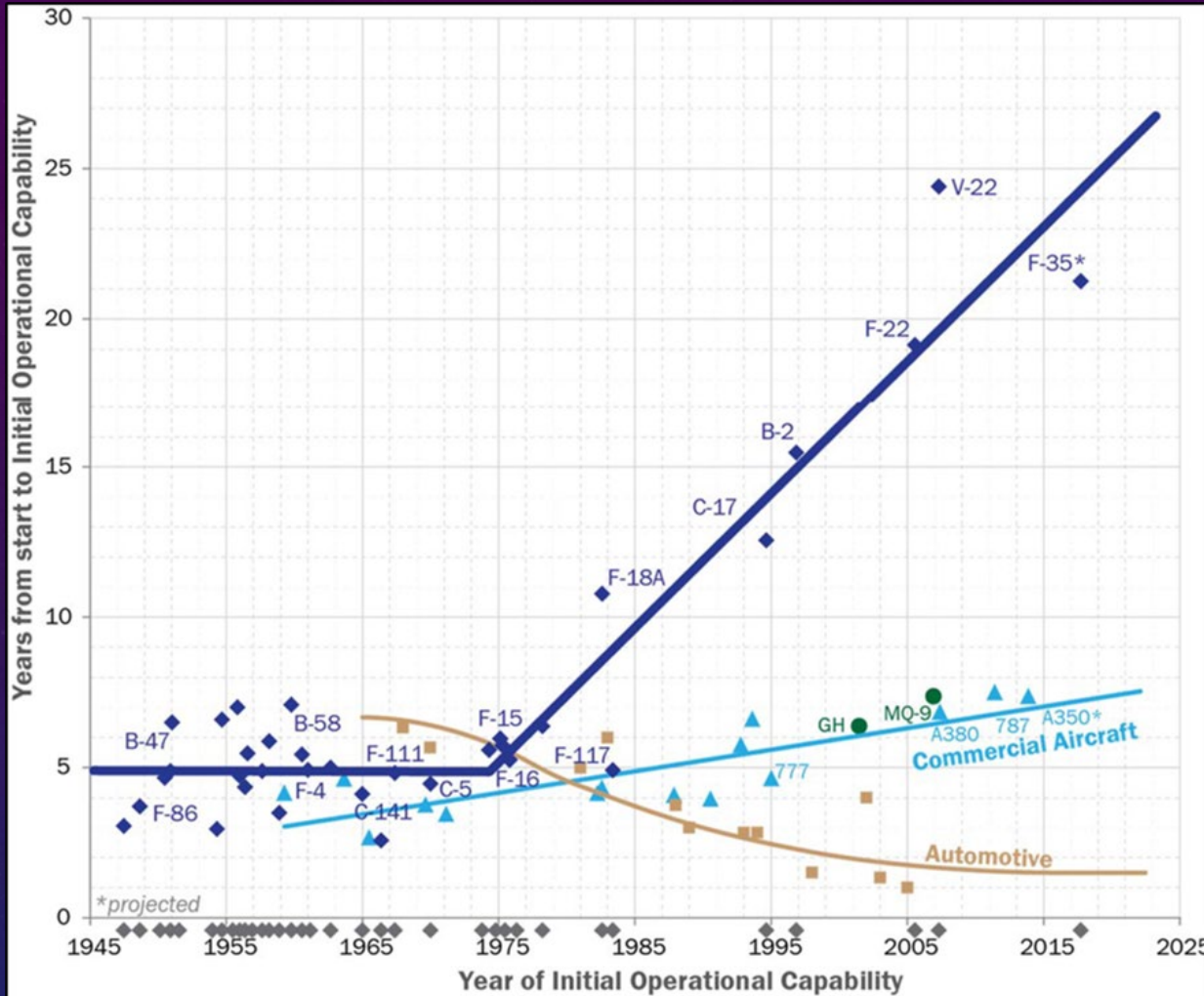# ANALYZING DIGITAL TRANSFORMATION USING THE ZACHMAN FRAMEWORK AND SYSML

MARK KASSAN

HQ AFMC/ENS (AF DIGITAL CAMPAIGN)

MS SYSTEMS ENGINEERING GRADUATE

AIR FORCE INSTITUTE OF TECHNOLOGY

# TIME TO FIELD CAPABILITIES



Source of graphic: DARPA/TTO Study: 2012

Problem:  Document-based acquisition is not able to handle the technological complexity

- Air Force Must digitally transform its acquisition enterprise
  - Must leverage digital technologies to fully interconnect Air Force research, acquisition, test, and sustainment enterprise
  - Must use digital models and artifacts integrated across the lifecycle

# THE AFMC APPROACH - DIGITAL CAMPAIGN

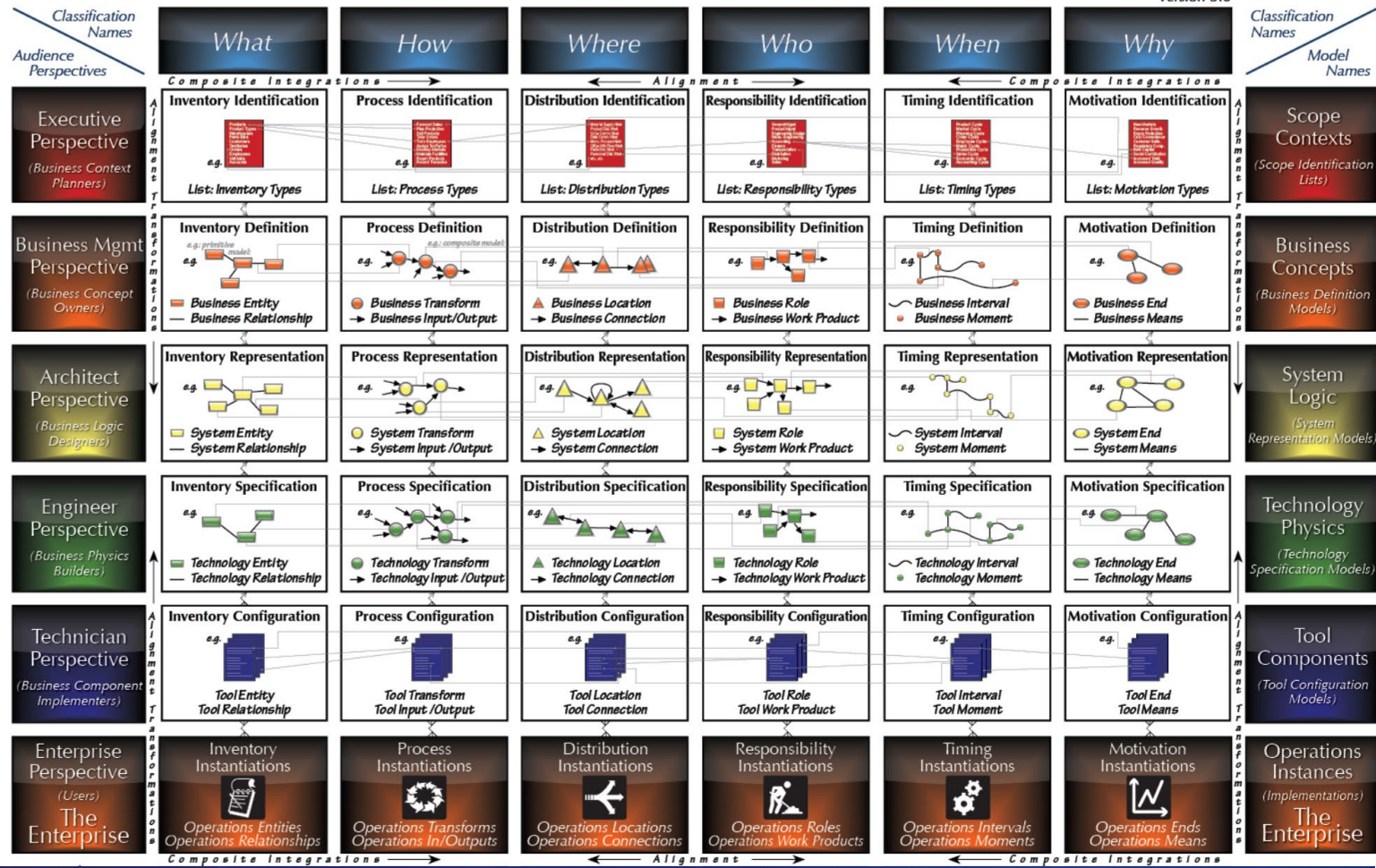| Line of Effort | Line of Effort Name | Line of Effort Goal |
| --- | --- | --- |
| 0 | Integrated Environment - IT Infrastructure | Provide overarching guidance to influence corporate IT improvement investments to enable a robust, secure infrastructure for the enterprise-wide Digital Campaign |
| 1 | Integrated Environment - Tools and Models | Provide an Integrated Digital Environment (IDE) of models and tools for collaboration, analysis, and visualization across the functional domains of AF users |
| 2 | Standards, Data, and Architectures | Provide overarching guidance on the use of Government Reference Architectures (GRA) and related standards and datasets for use in an integrated digital environment for application at the enterprise and system levels |
| 3 | Lifecycle Strategies and Processes | Develop Life Cycle Strategies and Processes for Technology Transition, System Acquisition and Product Support using an IDE, supporting lifecycle activities from concept development to disposal |
| 4 | Policy and Guidance | Assess and define the required policy and guidance updates/changes to enable full implementation of the Digital Transformation |
| 5 | Workforce and Culture | Drive culture change across the AFMC enterprise through training and change management, enabling a workforce well versed in Digital Engineering |

# THESIS RESEARCH QUESTIONS

- How can the digital transformation of the AFMC acquisition enterprise be modeled to visualize the primary impacts?

- How does modeling the digital transformation of the AFMC acquisition enterprise identify secondary impacts?

- What, if any, are the Digital Campaign gaps in pursuing change?

# MODELING ZACHMAN IN CAMEO WITH SYSML


The Zachman Framework for Enterprise Architecture™ — The Enterprise Ontology™ (Version 3.0)


Model tree showing:
- 1. Zachman Framework (As-Is) (by mkassan)
  - 1. Executive/AFMC Executive Perspective (As-Is) (by mkassan)
    - 1. Why (Exec) (by mkassan)
    - 2. How (Exec) (by mkassan)
    - 3. What (Exec) (by mkassan)
    - 4. Who (Exec) (by mkassan)
    - 5. Where (Exec) (by mkassan)
  - 2. Business Manager/Program Director Perspective (As-Is) (by mkassan)
    - 1. Why (BusM) (by mkassan)
    - 2. How (BusM) (by mkassan)
    - 3. What (BusM) (by mkassan)
    - 4. Who (BusM) (by mkassan)
    - 5. Where (BusM) (by mkassan)
  - 3. Architect/Chief Engineer Perspective (As-Is) (by mkassan)
    - 1. Why (Arch) (by mkassan)
    - 2. How (Arch) (by mkassan)
    - 3. What (Arch) (by mkassan)
    - 4. Who (Arch) (by mkassan)
    - 5. Where (Arch) (by mkassan)
  - 4. Engineer/System Engineer Perspective (As-Is) (by mkassan)
    - 1. Why (Engr) (by mkassan)
    - 2. How (Engr) (by mkassan)
    - 3. What (Engr) (by mkassan)
    - 4. Who (Engr) (by mkassan)
    - 5. Where (Engr) (by mkassan)
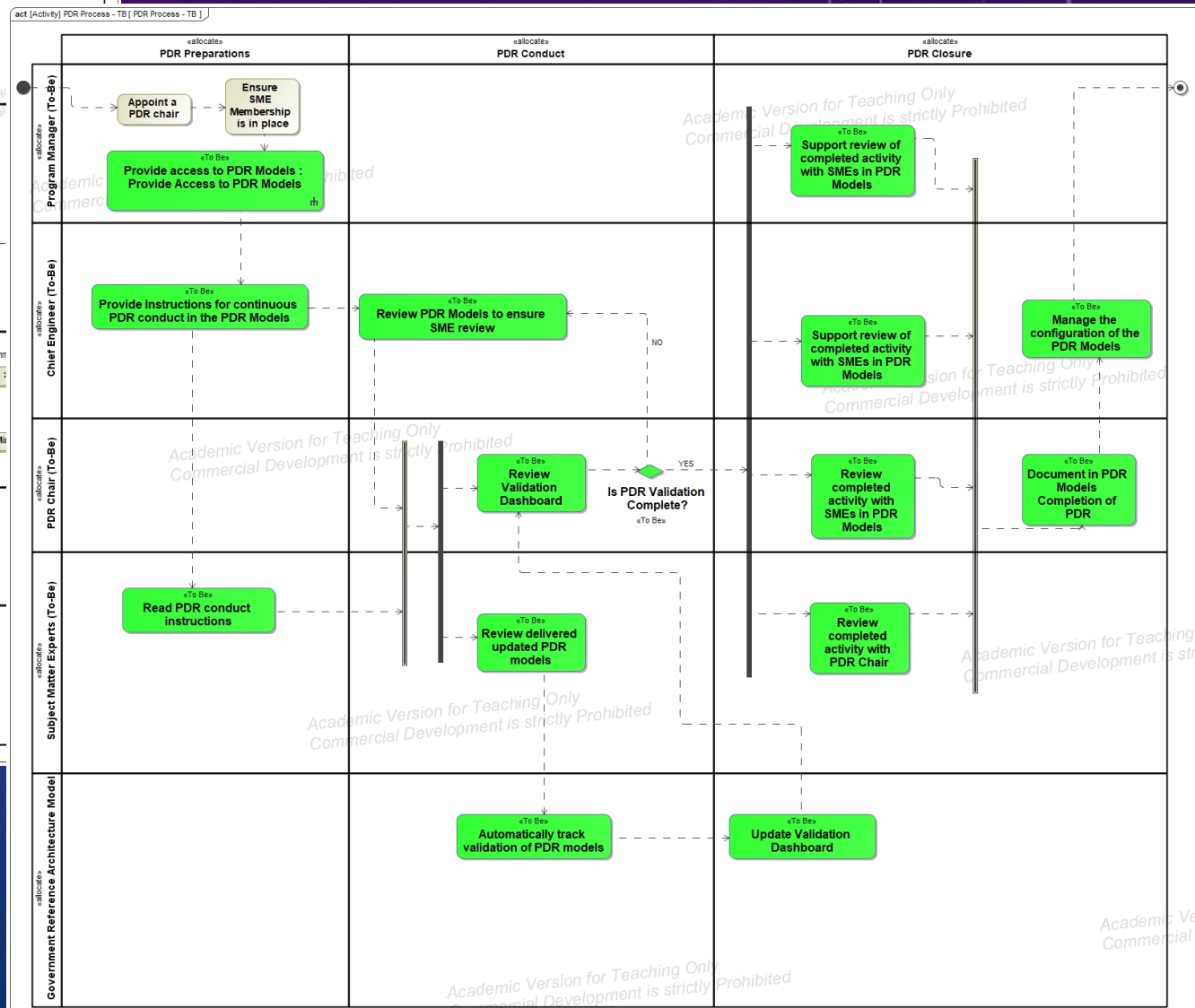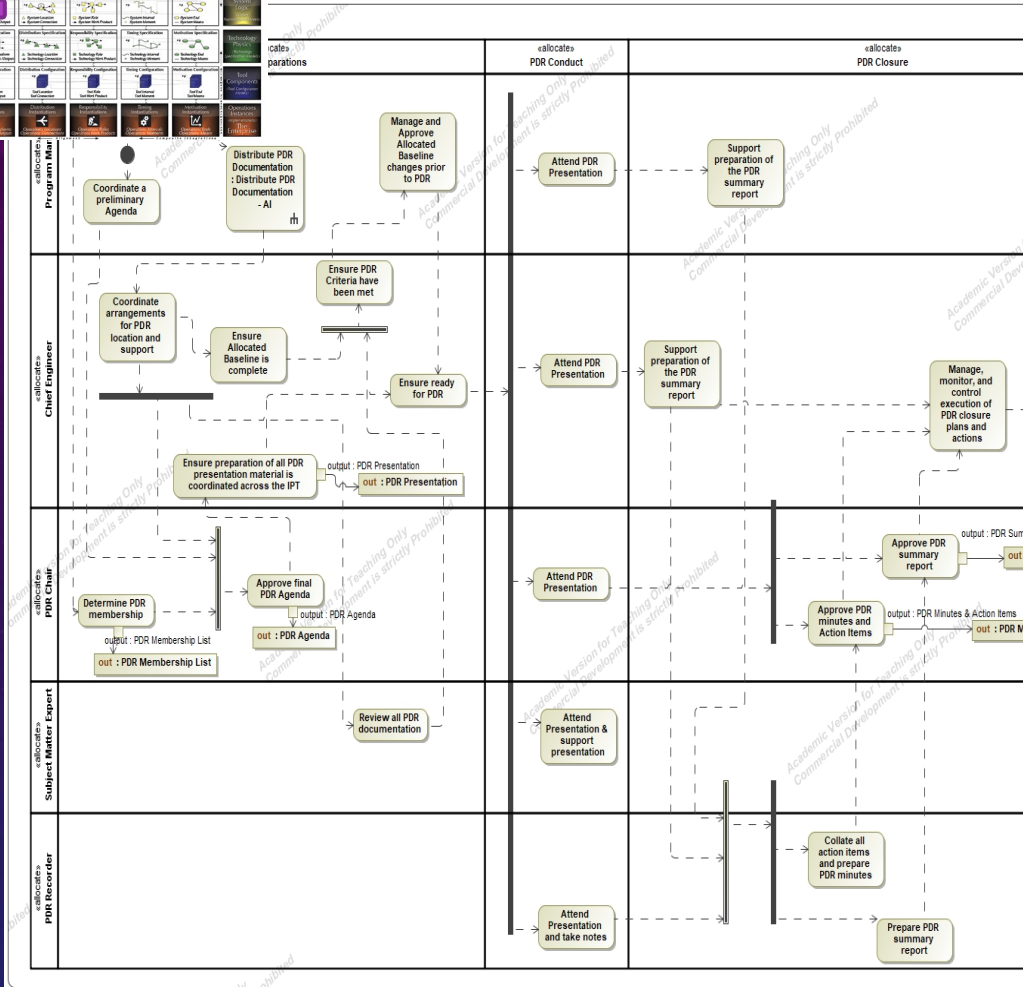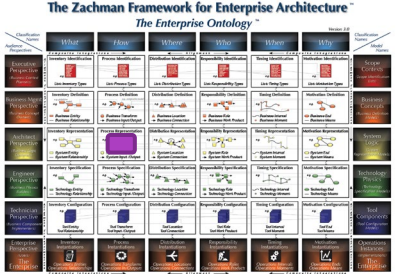
*When* interrogative was not done in this research
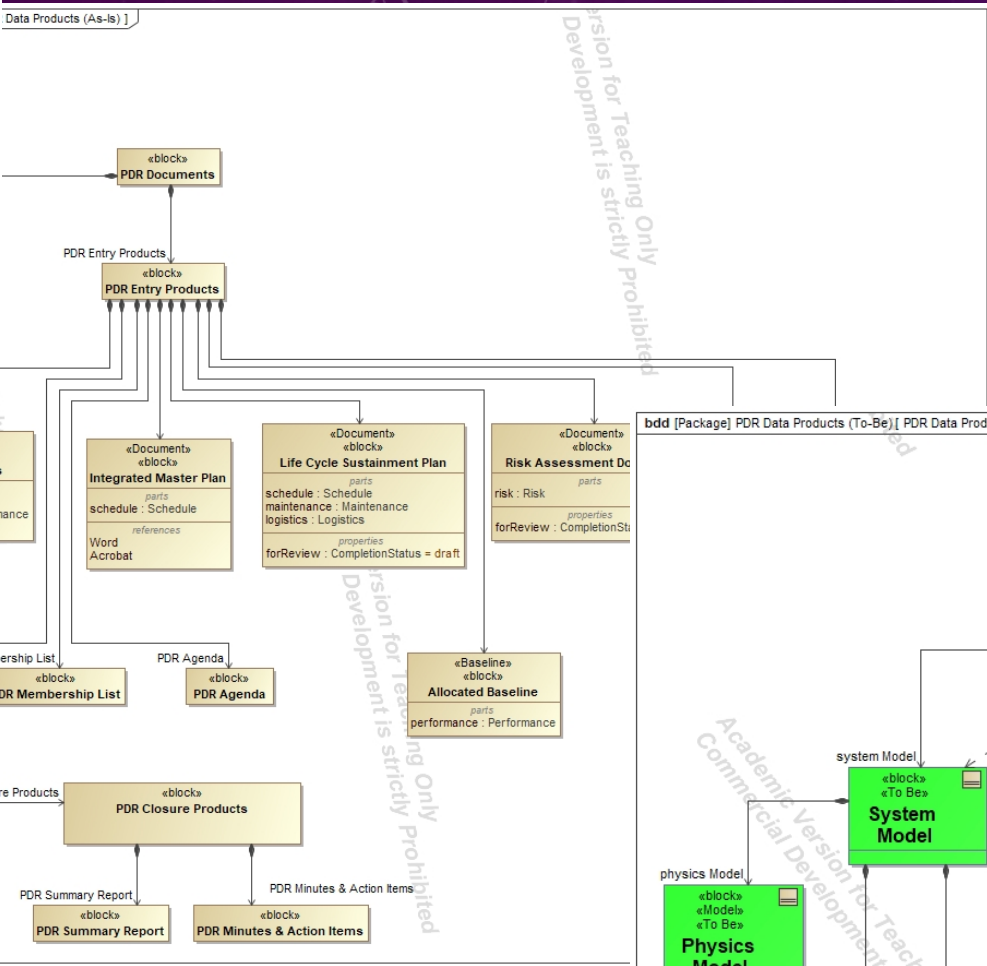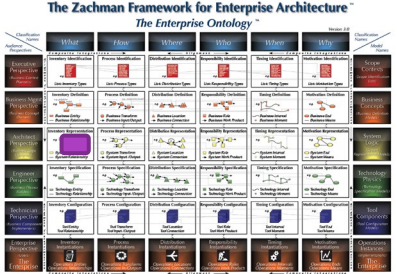
AS-IS => TO-BE
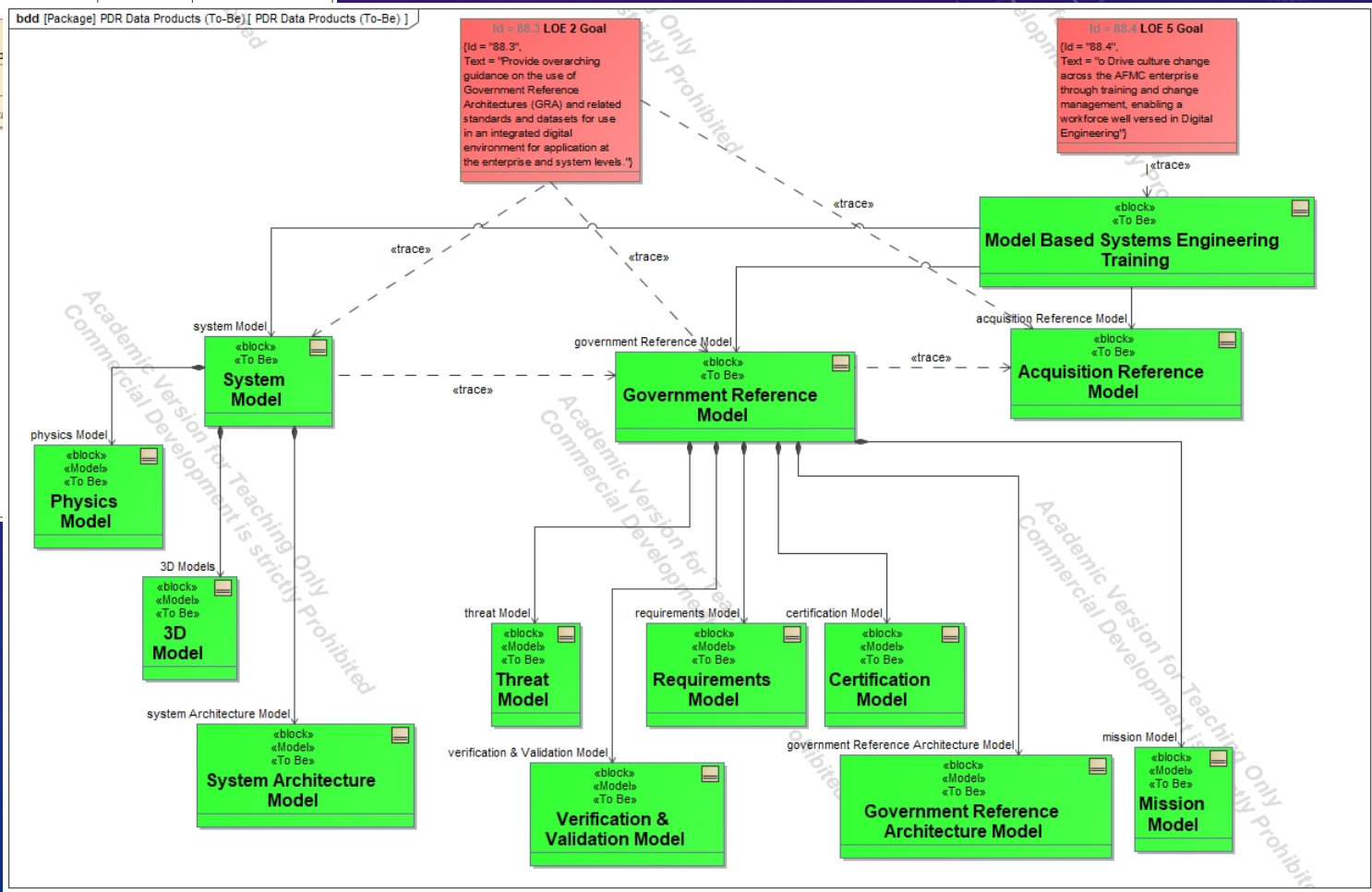
WHAT (ARCH):
PDR DATA PRODUCTS

AS-IS => TO-BE

HOW(ARCH):
CONDUCT PDR PROCESS

# DIGITAL CAMPAIGN - PRIMARY AND SECONDARY IMPACTS

| | WHY | HOW | WHAT | WHO | WHERE | WHEN |
|---|---|---|---|---|---|---|
| EXECUTIVE (AFMC Executive Leader) | Change to Stakeholders Requirements (LOE 5) | Conduct Acquisition Process | Enterprise Data [LOE 5] | Acquisition Enterprise | Acquisition Enterprise Locations | X |
| BUSINESS MANAGER (Program Director) | Change Technical Review Requirements (LOE 5) [LOE 0] | Conduct Technical Review Process [LOE 0] | PDR Data [LOE 0, 1] | Program Office | Technology Maturation and Risk Reduction Phase | X |
| ARCHITECT (Chief Engineer) | Change PDR Requirements (LOE 5) [LOE 2] | Change to PDR Process (LOE 3) [LOE 2, 5] | Change to PDR Data Products (LOE 2, 5) [LOE 0, 1, 3] | Change to PDR Participants (LOE 5) [LOE 0, 2, 3] | PDR Location [LOE 0] | X |
| ENGINEER (Systems Engineer) | Change PDR Technology Requirements (LOE 5) [LOE 0, 1] | Prepare/Maintain PDR Technology [LOE 0] | Change to PDR Technology (LOE 0, 1) [LOE 2, 5] | PDR Technology Personnel [LOE 0, 1] | PDR Technology Location [LOE 0] | X |
| TECHNICIAN (CONTRACTOR) | X | X | X | X | X | X |

Line of Effort (LOE) 0
- Provide overarching guidance to influence corporate IT improvement investments to enable a robust, secure infrastructure for the enterprise-wide Digital Campaign

LOE 1
- Provide an Integrated Digital Environment (IDE) of models and tools for collaboration, analysis, and visualization across the functional domains of AF users

LOE 2
- Provide overarching guidance on the use of Government Reference Architectures (GRA) and related standards and datasets for use in an integrated digital environment for application at the enterprise and system levels

LOE 3
- Develop Life Cycle Strategies and Processes for Technology Transition, System Acquisition and Product Support using an IDE, supporting lifecycle activities from concept development to disposal

LOE 5
- Drive culture change across the AFMC enterprise through training and change management, enabling a workforce well versed in Digital Engineering

| Secondary Digital Change | Primary Digital Change | (LOE X) = Line of Effort(s) Primary Impact to Cell | [LOE Y] = Line of Effort(s) Secondary Impact to Cell | PDR - Preliminary Design Review |
|---|---|---|---|---|

# DISCOVERING THE CAMPAIGN GAPS

GAPS

Logical - All interrogatives must have a primary goal to drive change to the functions of the enterprise.

Physical – All interrogatives must have a primary goal to drive implementation activities for an efficient transformation.

| | WHY | HOW | WHAT | WHO | WHERE | WHEN |
|---|---|---|---|---|---|---|
| EXECUTIVE (AFMC Executive Leader) | Change to Stakeholders Requirements (LOE 5) | Conduct Acquisition Process | Enterprise Data [LOE 5] | Acquisition Enterprise | Acquisition Enterprise Locations | X |
| BUSINESS MANAGER (Program Director) | Change Technical Review Requirements (LOE 5) [LOE 0] | Conduct Technical Review Process [LOE 0] | PDR Data [LOE 0, 1] | Program Office | Technology Maturation and Risk Reduction Phase | X |
| ARCHITECT (Chief Engineer) | Change PDR Requirements (LOE 5) [LOE 2] | Change to PDR Process (LOE 3) [LOE 2, 5] | Change to PDR Data Products (LOE 2, 5) [LOE 0, 1, 3] | Change to PDR Participants (LOE 5) [LOE 0, 2, 3] | PDR Location [LOE 0] | X |
| ENGINEER (Systems Engineer) | Change PDR Technology Requirements (LOE 5) [LOE 0, 1] | Prepare/Maintain PDR Technology [LOE 0] | Change to PDR Technology (LOE 0, 1) [LOE 2, 5] | PDR Technology Personnel [LOE 0, 1] | PDR Technology Location [LOE 0] | X |
| TECHNICIAN (CONTRACTOR) | X | X | X | X | X | X |

| | | | | | |
|---|---|---|---|---|---|
| Secondary Digital Change | Primary Digital Change | (LOE X) = Line of Effort(s) Primary Impact to Cell | [LOE Y] = Line of Effort(s) Secondary Impact to Cell | PDR - Preliminary Design Review | |

**Line of Effort (LOE) 0**
oProvide overarching guidance to influence corporate IT improvement investments to enable a robust, secure infrastructure for the enterprise-wide Digital Campaign

**LOE 1**
oProvide an Integrated Digital Environment (IDE) of models and tools for collaboration, analysis, and visualization across the functional domains of AF users

**LOE 2**
oProvide overarching guidance on the use of Government Reference Architectures (GRA) and related standards and datasets for use in an integrated digital environment for application at the enterprise and system levels

**LOE 3**
oDevelop Life Cycle Strategies and Processes for Technology Transition, System Acquisition and Product Support using an IDE, supporting lifecycle activities from concept development to disposal

**LOE 5**
oDrive culture change across the AFMC enterprise through training and change management, enabling a workforce well versed in Digital Engineering

For Instance: Goal could be: "Provide overarching guidance to influence IT locations for robust and secure infrastructure for business activities; ensure an organization and process is in place for the sustainment of IT infrastructure changes"

# FINDINGS

1. Enterprise modeling in Zachman is analogous to a system decomposition under typical systems engineering approaches

2. As long as the transformation goals do not change, the Zachman cells, and those entities mapped into those cells, will be directly affected

3. Different from past process transformation efforts, this focus is on technology upgrades to drive process change

4. Revealed transformation gaps that should be covered with new or modified goals

THANK YOU
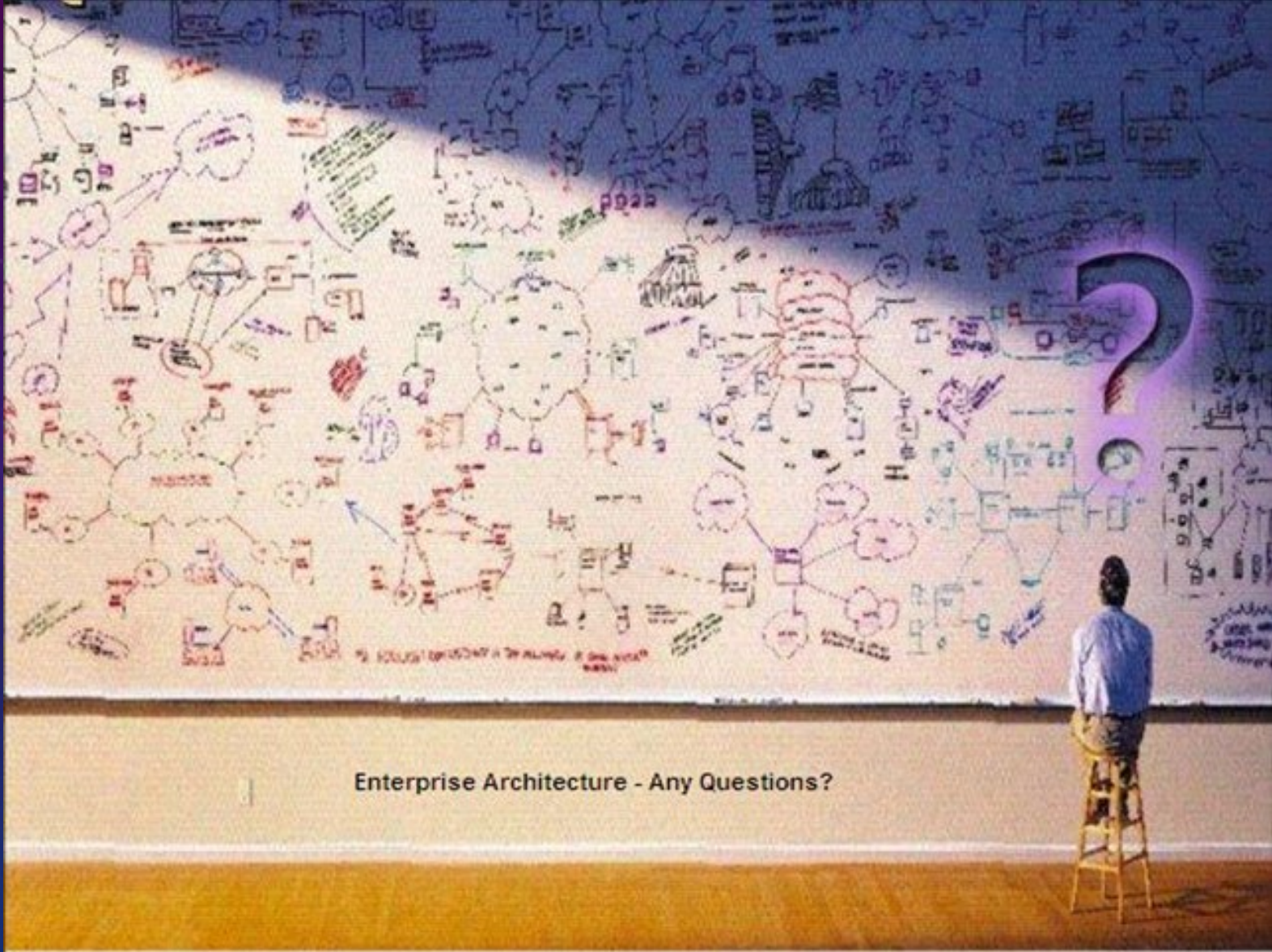


Enterprise Architecture - Any Questions?