Information Quality:
What's Enterprise Architecture Got to Do with It?

ABSTRACT-------------------------

This tutorial explores the relationships between the disciplines of Information Quality and Enterprise Architecture. It provides a highly practical approach to Enterprise Architecture that addresses the ways in which the dimensions of Information Quality are reflected in multiple aspects of an enterprise, and enables the architect to focus on Information Quality issues and solutions.

BIOGRAPHY---------------------

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Ms. Sowell is a recognized leader in Enterprise Architecture, having been the principal author of DoD’s original architecture framework, and a principal developer of other frameworks for Government and Industry. She retired from The MITRE Corporation, where she performed a leadership role in Enterprise Architecture for many Government clients. Her expertise has been tapped by NATO Headquarters, the Australian Ministry of Defence, Canadian corporations, the Danish Embassy, the Swedish military, and State and local governments. For five years she served as a curriculum developer, Technical Director, and Director of the DoD Division of the Federated Enterprise Architecture Certification Institute (FEAC). She now provides Enterprise Architect Certification and consulting through her company, Custom Enterprise Solutions, LLC, and National-Louis University.
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Objectives of this presentation

- Demonstrate the compatibility of the data quality discipline with Scenario-Based Enterprise Architecture
But First, What is Enterprise Architecture?

• **In general …**
  Enterprise Architecture is a **discipline** for analyzing the business of a community of interest, where the business should go, why it’s not there yet, and how to get it there

• **From an IT perspective …**
  Enterprise Architecture is a **discipline** for assessing and recommending candidate information technology solutions in an integrated context with business and mission operations

What Is an Architecture?

“*In simple terms, an enterprise can be viewed as any purposeful activity, and an architecture can be characterized as the structure (or structural description) of any activity.*” – Randy Hite, GAO
What is an Architecture?

An architecture is “the structure of components, their relationships, and the principles and guidelines governing their design and evolution over time.”

- C4ISR Architecture Framework, Version 2.0, derived from IEEE

What Is an Enterprise?

- Random House Dictionary:
  - A project undertaken
  - A commercial company

- Randy Hite (GAO): any purposeful activity

- Roget’s Thesaurus II: an exciting, often hazardous undertaking
Which Definition of Enterprise Should We Use In Enterprise Architecture?

- Some people think an Enterprise Architecture is always about a single organization (XYZ Corporation EA, Treasury Department EA)

- Others think an enterprise should often be about a problem area, whether it involves a single organization or many (Federal Health Care EA, Homeland Security EA)

Your “enterprise” is whatever your architecture is about.

Choose your enterprise carefully.

What's the Problem?

In the Enterprise Architecture Community, there are two seemingly opposed approaches:

- “It’s the data, stupid” vs. “Let the pictures tell the story”
What does “It’s the data, stupid” really mean?

- The (only) important aspect of an enterprise architecture is the underlying data.
- It doesn’t matter how you express this data to humans.
- It doesn’t matter if you express this data to humans.
- It is only important that the data conform to the data standards you have set up
  - format standards for storing in a database
  - quality standards for usability

What does “Let the pictures tell the story” really mean?

- The underlying data has to be “good,” but
- Humans think and understand quickly and well via visuals (pictures).
- Humans are the ones analyzing enterprise architecture data.
- Humans are the ones making decisions based on analysis of the enterprise architecture data.
- Most of these decisionmakers are not computer scientists.
But wait, they are both right.

SCENARIO-BASED ENTERPRISE ARCHITECTURE:
VISUAL, DATA-FOCUSED, TELLS A STORY

How can they both be right?

Information Quality professionals know that the definition of data “quality” is circumstantial:

- Data quality depends on where, when, why, how, and by whom the data needs to be used.

- One person’s “good enough” is another person’s disaster.
The Enterprise Architecture approach recommended here can help us take advantage of this circumstantial definition of data quality:

- Enterprise architecture “products” or “artifacts” are the visual renderings of selected information about your enterprise.
- Visual artifacts allow human stakeholders and decisionmakers to quickly grasp the logic of your message and analyze its validity and repercussions.
- The different circumstances under which information is to be used can be expressed as different story lines.
- To tell these different stories, we need a sequential, visual representation of our underlying enterprise architecture data.

Combine the discipline of Information Quality with Scenario-Based Enterprise Architecture

What is Scenario-Based Architecture?

- A representation of the various ways a given enterprise operates under different sets of conditions (circumstances)
- Examining a range of scenarios can help you determine if your enterprise (and its information/data) is robust enough to operate under the likely circumstances.
What are the basic components of a Scenario-Based Architecture?

- **Purpose Statement**: Tells what you intend to analyze via the architecture
- **Activity Model**: Shows the essential activities that occur, under any and all circumstances (i.e., irrespective of specific circumstances)
- **Node Connection Model**: Shows which business performers exchange information, irrespective of specific circumstances
- **Information Exchange Matrix**: Shows the detailed characteristics of the information exchanged
- **Scenario Sequence Models**: Illustrate multiple storylines showing the different ways the enterprise operates under specific conditions
- **Capability Progression Model**: Defines what it means to achieve certain levels of capability
- And, if you need details about technology used: *
  - Systems Connection Model
  - Systems Data Exchange Matrix

* For illustration, we will not consider technology factors here

What does a Scenario-Based Architecture with these components look like?

These represent the whole of the enterprise under consideration.

These tap into the whole of the enterprise information to select threads that illustrate specific story lines (sets of circumstances).
Purpose Statement sets the stage for your enterprise analysis

- Why you are developing the architecture
- What issues you will examine, what questions you hope to answer
- Who are your stakeholders, decisionmakers
- What artifacts (models) you will construct
- How you will approach and tailor the models
- How you will know when you are finished
- How you will know if you have succeeded

The Activity Model shows the relevant* actions that take place in your enterprise (irrespective of scenario)

Activity Hierarchy Tree

* Relevant to the purpose & scope of the architecture

Activity Flow Model
The Node Connection Model shows which enterprise participants need to interact with each other (irrespective of scenario).

This example shows the organizational nodes decomposed to illustrate the human roles in each node.

The Capability Progression Model (CPM) defines levels of ability in selected capability areas (irrespective of scenario).

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**Example: CPM of Collaboration Capability**

**Level 2 of the Collaboration Capability is Determined to be the Target Capability — and the First Segment of the Capability Profile**

1. **Managed**
   - Functional activities, engaged in common operations on the same intranet, utilize minimal document-oriented collaboration capabilities to exchange information and ideas, coordinate schedules, and conduct document review and comment using basic, asynchronous collaboration tools.

2. **Performing**
   - Functional activities work collaboratively with each other, with mission customers, and with other IC-external experts and knowledge sources to analyze, synthesize, produce, and tailor information to accomplish mission objectives.

3. **Structured**
   - Functional activities, engaged in common operations on the same intranet, utilize minimal document-oriented collaboration capabilities to exchange information and ideas, coordinate schedules, and conduct document review and comment using basic, asynchronous collaboration tools.

4. **Quantitatively Managed**
   - Functional activities pool their complementary skills and knowledge in jointly analyzing, synthesizing, producing, and tailoring information to accomplish mission objectives.

5. **Optimizing**
   - Functional activities work collaboratively with each other, with mission customers, and with other IC-external experts and knowledge sources to analyze, synthesize, produce, and tailor information to accomplish mission objectives.
A Scenario Sequence Diagram shows a series of events, and the information exchanges that occur in response to events of a given scenario.

Scenario Sequence Diagram

The Information Exchange Matrix captures the relevant quality (and other) characteristics of information as it is used in a given scenario.

Who needs what information or goods may differ by scenario.
Required characteristics of that information or data may differ by scenario.
But where does information quality fit in?

- Information quality depends on where, when, why, how, and by whom the information needs to be used.
- The various scenarios illustrate where, when, why, how, and by whom the information needs to be used, one storyline at a time.
- The Capability Progression Model provides a scale for defining capabilities related to information quality (and other factors).
- The Information Exchange Matrix details the characteristics, including quality attributes, of information as it is used in these various circumstances.
- Examination of the Information Exchange Matrix in context with the Capability Progression Scale allows the architect to define "success" for each scenario.

By examining a representative range of these scenarios and their information quality requirements, the architect can measure the range of quality requirements for given information items. **For example:**

- "Depending on circumstances, information item X needs to be.."
  - from one minute to one hour old
  - validated by a level one manager to a level three manager
  - precise to a level of one decimal place to three decimal places
Summary

- Yes, it is the data (and information) that is important.
- Yes, it is the visual representation of that data that is important.
- The quality of the data depends on the circumstances.
- Visual, Scenario-Based Enterprise Architecture helps you explain the circumstances and the resulting data quality assessment to human decisionmakers.