Enterprise Architectures and Information Systems - Especially where Information Management is the Business

Bo Sundgren
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Enterprise architectures (EA) and information systems

A general review of Enterprise Architectures (EA), including purposes, definitions, scope, and methods, can be found in Sundgren (2012). In this presentation, I will discuss, inter alia, the following issues:

• The role of information systems and information system architectures in EA frameworks is not quite clear

• Information systems typically appear on the solution level, not so often on the business level or the strategic level

• Information system architectures typically have two orthogonal dimensions:
  – Concepts and data structures (conceptual models and data models)
  – Processes (process models)

• EA frameworks seem to focus more on processes than on concepts and data structures

• But in some enterprises information management is the business – or at least a very essential part of the business

Enterprises where information management is the business

There are enterprises, where information management is the business – or at least an important part of the business. Some examples:

• Production of official statistic
• Archive management
• Business intelligence systems
• Public libraries, databases, and register systems
• Knowledge bases and open access journals
• Research-supporting systems
• E-commerce systems

Important notes:

• Most of these enterprises are multi-purpose and serve partly unknown customers and needs
• Complex metadata subsystems and data quality issues are typically essential
Statistical information systems

See …

*Figure 1* illustrates the role of a statistical information system in society. Statistical systems (and archival systems) may have analogous roles in enterprises.

*Figure 1. The role of a statistical information system in society.*

Source: Sundgren (2004b) “Statistical systems – some fundamentals”.

*Figure 2* provides a high-level, generic conceptual model for a statistical system belonging to official statistics. *Figure 3* provides a concrete specification of the generic model for UNESCO education statistics.

Figures 4-8 provide examples of process models of statistical systems.
Generic model of the contents of official statistics

- All objects are described by means of variables.
- Some variables are classification variables, e.g. “Sex of Person”.
- Other variables are summation variables, e.g. “Income of Person”.
- By using the relations between the objects, one may define derived variables, adjoined variables, such as “DwellingSize of Person” = “Size of Dwelling of Residence of Person”.
- By using summation operators on summation variables, one may derive values of parameters of populations or domains of objects of a certain type, e.g. “average(Income of Persons)”. The two types of derivations may also be combined, even repeatedly and recursively.
- Claim: The contents of all branches of official statistics can be expressed as specialisations of this generic model. This has been verified in a large number of practical examples, and no counter-examples have been found.

Figure 2. Generic model of the contents of official statistics.
Figure 3. Conceptual model of UNESCO education statistics.
Architecture for statistical systems

Figure 4. Architecture for statistical systems.

Statistics production: product development and production processes

Figure 5.


Basic operations in a database-oriented statistical system

Source: Sundgren (2004b) “Statistical systems – some fundamentals”. Figure 6.

Control and execution of a statistical system

Source: Sundgren (2004b) “Statistical systems – some fundamentals”. Figure 7.
Modern archives and corporate data warehouses

The statistical archive system

The concept of a statistical file system – or a statistical archive system – was established by Nordbotten in the early 1960’s. He established the following principles for an archive-statistical system:

- Reuse existing raw data from administrative and statistical sources – for statistical purposes
- Continuous inflow of data (more or less)
- Organise data in a systematic way: statistical file system, databases, data warehouse
- Ad hoc production of statistics
- Systematic descriptions and definitions of data:
  - data and table definition languages; Nordbotten (1967): "Automatic Files in Statistical Systems"
  - metadata; Sundgren (1973): "An Infological Approach to Data Bases"
- Standardised definitions and identifiers enabling flexible integration and combination of data: registers, classifications, standard variables
- Generalised software


Figure 8.
See also:


Summary of the EU vision for official statistics

- **Current situation: the augmented stovepipe model**
  - respondents asked for the same information more than once
  - not adapted to collect data across domains
  - little standardisation and coordination between areas

- **Demands for change:**
  - new information needs, often across domains, often ad hoc (e.g. in crises)
  - decrease response burden
  - use new ICT methods and tools to increase efficiency

- **Consequences on the level of Member States:**
  - holistic approach, stovepipes replaced by integrated production systems around a data warehouse
  - data obtained from existing administrative data and/or extracted directly from company accounts, combining survey data with administrative data, new efforts to ensure the quality of the data

- **Consequences on the EU level:**
  - Horizontal integration similar to the Member State level
  - Two elements of vertical integration: (i) collaborative networks, and
  - (ii) direct production for the EU level, when there is no need for national data

The Data Documentation Initiative


Figure 9 illustrates the architecture of a modern archive system from different points of view.
What is DDI? (1)

"A metadata specification for the social and behavioral sciences"
"Document your data across the life cycle"

What is DDI? (2)

"supporting the entire research data life cycle"

What is DDI? (3)

- **DDI- Codebook** (formerly DDI-2)
  - strictly data oriented
- **DDI- Lifecycle** (formerly DDI-3)
  - process and data oriented

Figure 9. DDI – An architecture for modern archive systems.
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