Data-Driven Business Intelligence Systems: Part II

Week 6
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Lecture Outline
- On-Line Analytical Processing (OLAP)
- Executive Information Systems (EIS)
- EIS Development Framework

Learning Objectives
At the end of this lecture, the students will
- Have understanding of On-Line Analytical Processing (OLAP) and Executive Information Systems
- Have understanding of executive information needs
- Have knowledge of EIS development
On-Line Analytical Processing (OLAP)

Term coined by Codd to highlight differences between transactional processing and analytical processing:
- Transactional processing of operational data not suitable for answering managerial questions
- Provides conceptual and intuitive model
- Provides data retrieval at the “speed of thought”
- FASMI Test by Pendse (2003)
- 12 Rules by Codd, Codd & Salley (1993)
- OLAP Council

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>OLAP</th>
<th>OLTP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation</td>
<td>Analyse</td>
<td>Update</td>
</tr>
<tr>
<td>Screen format</td>
<td>User-defined</td>
<td>Unchanging</td>
</tr>
<tr>
<td>Data transaction</td>
<td>Considerable</td>
<td>Little</td>
</tr>
<tr>
<td>Level of detail</td>
<td>Aggregate</td>
<td>Detail</td>
</tr>
<tr>
<td>Time</td>
<td>Historical, current, projected</td>
<td>Current</td>
</tr>
<tr>
<td>Orientation</td>
<td>Attributes</td>
<td>Records</td>
</tr>
</tbody>
</table>
On-Line Analytical Processing

FASMI Test by Pendse (2003)
- Fast
- Analysis
- Shared
- Multidimensional
- Information

http://www.olaprep.com/fasmi.htm

On-Line Analytical Processing

12 OLAP Rules by Codd, Codd & Salley (1993)

<table>
<thead>
<tr>
<th>Multidimensional view</th>
<th>Dynamic sparse matrix handling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transparent to the user</td>
<td>Multi-user support</td>
</tr>
<tr>
<td>Accessible</td>
<td>Cross-dimensional operations</td>
</tr>
<tr>
<td>Consistent reporting</td>
<td>Intuitive data manipulation</td>
</tr>
<tr>
<td>Client/server architecture</td>
<td>Flexible reporting</td>
</tr>
<tr>
<td>Generic dimensionality</td>
<td>Unlimited dimensions, aggregation</td>
</tr>
</tbody>
</table>

On-Line Analytical Processing

Storage paradigms to support OLAP
- Desktop OLAP (DOLAP) – desktop files
- Relational OLAP (OLAP) – relational database servers
- Multidimensional OLAP (MOLAP) – multidimensional database servers
On-Line Analytical Processing

Representative OLAP / Multidimensional Analysis Packages
- BrioQuery (Brio Technology Inc.)
- Business Objects (Business Objects Inc.)
- Decision Web (Comshare Inc.)
- DataFountain (Dimensional Insight Inc.)
- DSS Web (MicroStrategy Inc.)
- Focus Fusion (Information Builders Inc.)
- InfoBeacon Web (Platinum Technology Inc.)
- Oracle xpress Server (Oracle Corporation)
- Pilot Internet Publisher (Pilot Software Inc.)
- Cognos Reportnet (Cognos)
On-Line Analytical Processing

Cognos ReportNet

Hypheson's Business Performance Management

Executive Information Systems (EIS)
Executive Information Systems

- Intended to provide current and appropriate information to support executive decision making
- Emphasis is on graphical displays, easy-to-use interface
- Designed to provide reports or briefing books to top-level executive
- Strong reporting and drill-down capabilities

Executive Information Systems

- Shared decision support systems
- Can only support ‘recurring’ information requirements
- Very high profile
- Relatively expensive

Executive Information Systems

- Tailored to individual executive users
- Designed to be easy to operate & require little or no training
- Focused on supporting upper-level management decisions
- Can present info in graphical, tabular & text
- Provides access to info from broad range of internal & external sources
- Provides tools to elicit, extract, filter, & track critical information
- Provides a wide range of reports including status reporting, exception reporting, trend analysis, drill down investigation, & ad hoc queries
Executive Information Systems

What an EIS is NOT

- It is not a substitute for other computer-based systems. The EIS actually feeds off these systems.
- It does not turn the executive suite into a haven for computer "techies".
- It should be viewed by senior management as a trusted assistant who can be called on when and where necessary.

Executive Information Systems

Why Are Top Executives So Different?

- They are enterprise-oriented in thinking
- They possess the broadest span of control
- They are responsible for establishing policy
- They represent the organization to the external environment
- Their actions have considerable financial and human consequences
**Executive Information Systems**

**Executive Information Needs**
- Disturbance management may require around-the-clock attention.
- Entrepreneurial activities require the executive to predict changes in the environment.
- Resource allocation tasks require the manager to choose when and where the limited resources are deployed.
- Negotiation requires up-to-the-minute info to help build consensus.

**Frequency of Executive Activities**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disturbances</td>
<td>42%</td>
</tr>
<tr>
<td>Entrepreneurial Activities</td>
<td>32%</td>
</tr>
<tr>
<td>Resource Allocation</td>
<td>17%</td>
</tr>
<tr>
<td>Negotiation</td>
<td>3%</td>
</tr>
<tr>
<td>Other</td>
<td>6%</td>
</tr>
</tbody>
</table>

**Methods for Determining Information Needs**

Rockart identified five basic methods for determining information needs:
- By-Product Method
- Null Method
- Key Indicator Method
- Total Study Method
- Critical Success Factors Method
Executive Information Systems

Critical success factors

- Concentrate on the most important information requirements
- Common technique
- Critical success factors (CSFs) are the few key areas where things must go right in order to achieve objectives and goals
- Critical failure factors (CFFs) are the factors whose existence or lack of existence can contribute to failure

Executive Information Systems

Key Performance Indicators

- How do you know how well you are doing against your CSFs? KPIs
- A KPI is a measurement that tells us how we are performing in regard to a particular CSF
- A single CSF may have multiple KPIs
- An EIS is a useful tool for assessing KPIs, and therefore for understanding CSFs
- By concentrating on these critical factors, we have a starting point for systems analysis – we know that CSFs and their KPIs are going to be mandatory information requirements
- Provides structure for requirements elicitation interviews

Executive Information Systems

General CSF interview approach

- Explanation of CSF interview objectives
- Interviewee is asked to:
  - Describe organisational mission and role
  - Discuss goals
  - CSFs are developed
  - CSFs priorities are determined
  - Measures are developed (KPIs)
Executive Information Systems

CSFs & KPI's in an EIS

Executive Information Systems

The EIS

External Data

OLAP

Relationship of OLAP to EIS Architecture

Executive Information Systems

Executive Workstation

To Here

From Here

Executive Workstation

To Here

Executive Information Systems

Executive Information Systems

Executive Workstation

To Here

Executive Workstation

To Here

Executive Information Systems

Executive Workstation

To Here

Executive Workstation

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To Here

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To Here

Executive Workstation

To Here
Executive Information Systems

EIS Development Framework

An EIS Development Framework

Watson, et al suggest a framework with three components:
1. Structural perspective: focus is on people and data as they relate to the EIS.
2. Development process: the dynamics and interactions are identified.
3. User-system dialog: contains an action language for processing the commands.
An EIS Development Framework

Some EIS Limitations and Pitfalls to Avoid

- **Cost:** A 1991 survey showed an average development cost of $365,000 with annual operating costs of $200,000.
- **Technological limitations:** The EIS needs to be seamlessly integrated into the company’s current IT architecture, so it is a formidable challenge to the designer.
- **Organizational limitations:** The organizational structure might not be right.

Organizational Limitations

- **Agendas and time biases:** The EIS represents only part of executive’s total agenda, and it may become easy to be overly reliant on it.
- **Managerial synchronization:** Heavy reliance on the timely, ad-hoc, EIS reports may disrupt stable, well-established reporting cycles.
- **Destabilization:** Fast EIS response may cause the executive to react too swiftly, leading to less stability in the organization.

Failure is not an Acceptable Alternative

Some factors that contribute to EIS failure:

- Lack of management support
- Political problems
- Developer failures
- Technology failures
- Costs
- Time
An EIS Development Framework

The Future of Executive Decision Making and the EIS

Several conditions will merge to transform the technology. Some are easy to predict, some not. Two that we can foresee are:

- Increased comfort with computing technology in the executive suite will make innovations more readily accepted.
- Broadening of executive responsibilities will broaden the demand for information.

The EIS of Tomorrow

- The intelligent EIS: advances in AI technology will be deployed in the EIS
- The multimedia EIS: multimedia databases will allow future integration of text, voice and image
- The informed EIS: future EISs will make wider use of data external to the company
- The connected EIS: high-bandwidth communication allows greater interconnectivity

References