

# Executive Information Systems Development Life cycle

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**ABSTRACT:** The Main objective of EIS (Executive Information Systems) is to provide in real time representative information to the high-level management.

EIS is a subset of a class of technology solutions that also are referred to in the industry as goal setting, planning and forecasting and tracking performance.

This paper presents the concept and the architecture of EIS and also the criteria for evaluating Executive Information Systems.

**Keywords:** *Business Intelligence (BI), EIS, DSS, Data integration, Data Warehouse, OLAP (On-Line Analytical Processing), Data Mining.*

## 1. INTRODUCTION

EIS is a subset of a class of technology solutions that also are referred to in the industry as business intelligence (BI) software. The main objective of EIS (Executive Information Systems) is to provide in real time representative information to the high – level management, to support strategic activities such as goal setting, planning and forecasting, and also tracking performance [1].

Another objective of these systems is to gather, analyze, and integrate internal and external data into dynamic profiles of key performance indicators. Based on each executive's information needs, EIS can access both historical and real – time data through ad – hoc queries. EIS users can manage and manipulate multidimensional or cube – like databases. In essence, managers at every level can have a customized view that extracts information from disparate sources and summarizes it into meaningful indicators.

Many organizations use modern EPR systems for transaction processing and reporting.

Information from applications within a ERP system is managed by a relational software database. Executives need information for strategic and tactical decision that often requires the combination of data from EPR and non – EPR application sources [2].

## 2. EIS ARCHITECTURE

EIS architecture is common to Decision Support System's architecture and it's structured on three distinct levels [3]:

- Data Management - represented by relational databases, data ware houses and other type of data sources;

- Model Management – level of extract, transformation and processing of data. This level is based on different type of models for statistic interpretation, analyzing and forecasting data;

- Data Visualization Tools – provide a visual drill – down capacity that can help managers examine data graphically and identify complex interrelationships. EIS attempts to present data in a form that is relevant for strategic decisions.

The architecture is implemented by the following technologies: data warehouse, OLAP, Data Mining.

## 3. EIS LIFECYCLE

There are some major differences between OLTP systems lifecycle and EIS lifecycle which depends on executive systems characteristics, but the same traditional techniques and stages are used for development: justification, project planning, design, construction, deployment (fig.1).

In these stages there are many steps used for modeling EIS characteristics such as:

- EIS are oriented on business opportunities rather than transactional needs;

- EIS have to implement strategic decisions, not only departmental or operational decisions;

- EIS analysis is focused on business needs. This stage is the most important of the process;

- Development process is cyclical, focused on evaluation and improvement of successive versions, not only building and major delivering of a singular an final version.

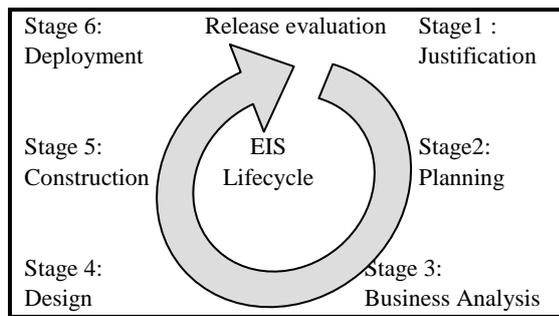


Fig 1. EIS development lifecycle.

EIS lifecycle is divided in 6 stages and 16 steps as following [4]:

### Stage 1: Justification

**Step 1: Business case assessment-** business needs and opportunities are identified and then the team proposes an initial solution justified by costs and benefits. A preliminary report is built-up.

### Stage 2: Planning

**Step 2: Enterprise infrastructure evaluation-** this step estimates and values organization's capabilities to sustain and accomplish the EIS project in terms of: infrastructure, components, devices, network and also future needs of these equipments. In this step is built organization's infrastructure.

**Step 3: Project planning-** EIS involves dynamical project planning which leads to rapid changes in technology, organization and business needs, human resources and implementing team. The project plan is detailed, progressive, each stage and step has checking points and test documents and reports.

### Stage 3: Business analysis

**Step 4: Defining business needs and project requirements-** interviews and meetings are organized with executives and managers and business needs and requirements are identified and defined. An initial solution is proposed, discussed and adopted.

**Step 5: Data analysis-** this step involves identifying and designing data sources, designing detailed ER diagrams with attributes and references between data. The logical model is designed.

**Step 6: Application prototyping-** An initial prototype is built and tested in order to validate business needs. After testing

results are estimated and reported with positive and negative aspects.

**Step 7: Metadata analysis-** metadata are designed and data sources are mapped on metadata structure. CASE tools are used for designing and mapping process.

### Stage 4: System design

**Step 8: Data design-** in this step the logical model is detailed and refined and physical model is designed. The data model for processing and storage are selected from the following options: relational, object oriented and multidimensional model.

**Step 9: Designing ETL process (extract / transform / load)-** this step is the most difficult in the entire cycle and depends on quality of data sources. It is recommended that the process should be built in one environment which integrate all modules of the organization and not separately, on each department. The rule should be: share one coordinated ETL process.

**Step 10: Metadata repository design- if it is used a pre- defined solution for metadata repository then in this step it is adjusted for project requirements, otherwise a metadata repository is designed in terms of metadata logical model deepening on data model: relational, object oriented or multidimensional.**

### Stage 5: Construction

**Step 11: ETL development-** filtering tools, procedures, operators are used for building ETL process. Data filtering and transformations depends on data sources quality. These sources are different like: files, databases, e-mail, internet, unconventional sources.

**Step 12: Application development-** after prototype validation, building the final application may be a simple process. Procedures templates and interfaces are rebuilt, user rights and privileges are granted.

**Step 13: Data Mining-** executive systems have to implement data mining capabilities in order to succeed and accomplish managers requirements. This step involves testing algorithms, data mining techniques like clustering, predictive and organizing methods.

**Step 14: Developing metadata repository-** if the metadata repository has to be built-

up then metadata dictionary and data access interfaces are developed.

#### **Stage 6: System deployment**

**Step 15: Implementation-** it is the delivering process in which the development team organize training sessions for managers, final documentations and technical support are prepared, data loading process and application setup is accomplished.

**Step 16: Release evaluation-** after system implementation preliminary conclusions are made, costs are estimated and the development team build a final report in which are describe system performances and also some parts which have to be improved or re-built-up.

#### **4. CRITERIA FOR EVALUATING EIS**

Developing EIS systems involves time, high – costs and human resources, efforts and an EIS must be capable to provide in real time representative information to the executive management.

Deploying EIS involves many risks: system design, data quality, and technology obsolescence. System design risks stem from poor conceptualization of an enterprise's true business needs before the technology is deployed. Data quality risks relate primarily to whether or not data has been properly cleansed. Technology obsolescence refers to the failure on the part of the vendor to anticipate new technologies [5].

Large budgets and strategic information are involve in deploying EIS systems – this is the reason to establish rigorous criteria for evaluating EIS systems. These criteria are discussed below [6]:

##### **• Decisions based on business process**

EIS should not be viewed only as a data repository or a large set of data. Instead, system's implementation should be concern on conceptualizing new data models, processes, and indicators that form the content of EIS. EIS should provide extensive understanding of the benchmarks that are useful to evaluate business processes.

##### **• Performance**

This feature typically refers to the response time that a system provides to its users. Most responses should range from a few seconds to a maximum of 30 seconds for routine queries. Response times depend on the complexity of the database and the queries being requested.

##### **• Flexibility and scalability**

Flexibility determines whether an EIS solution can continually adapt to changing business conditions after the system has been delivered. An EIS should be able to accommodate changes in any type of business process and functions like personnel, services, and processes, as well as new mandates, laws, and regulations requiring the capture of different types of data.

An EIS should be expandable to accommodate data growth and changes to organizational structure. EIS also should allow contributed content to grow without a slowdown in performance.

##### **• Integration**

Integration involves two types of issues: data integration and system integration. Data integration is the ability to access data from many different type of systems. An EIS will be particularly effective if it can overcome the challenge of information fragmentation, allowing executives to measure features of business processes that involve information from inside and outside of the organization.

System integration refers to two things: the ability to extent the EIS software with new capabilities and modules and the system's ability to coexist with other enterprise solutions.

##### **• Friendly user interface**

An EIS Should be designed to allow managers who are not trained to use query languages and advanced technologies, a fast, easy, and understandable way to navigate into data and identify trends and patterns. EIS should permit the user interface to accommodate different degrees of technical knowledge.

#### **5. CONCLUSIONS**

EIS systems have a powerful impact on strategic decisions quality to reduce the time for making decisions.

EIS must have the ability to allow managers to view data in different perspective, to drill-down and roll – up to aggregate levels, to navigate and on – line query data sets in order to discover new factors that affect business process and also to anticipate and forecast changes inside and outside the organization.

EIS improve the quality of management in organization through new type of technology and techniques for extracting, transforming, processing and presenting data in order to provide strategic information.

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