Data Warehouse
Requirements Analysis

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Introduction

- Requirements analysis is the foundation of the most DW life cycle choices (Kimball et all, 2008)
- However, organisations have paid minimal attention to requirements analysis and have often neglected this aspect in DW projects (Rizzi et al, 2006)), especially because
  - (1) DW projects are long-term processes, in which most requirements are unidentifiable at the beginning of a project, and because
  - (2) requirements are difficult to share across organisations, unstable over time and relate to information that must be obtained from data sources (Winter and Strauch, 2003)

DW Requirements Analysis

- Requirements analysis for DWs is different from that applied to other types of information systems.
- The identification of relevant information for decision making is the main focus of such analysis for DW development.
- instruments used for requirements analysis:
  - ✓ Interviews: basic technique for eliciting requirements from users based on one-on-one interview
  - ✓ Workshops: an intensive discussion and activity to explore a particular subject or project
  - ✓ Prototyping: a preliminary model to test a concept or process
  - ✓ scenario building : conceptualized specific requirements
  - ✓ subject area analysis : a generic way to describe information pertaining to a specific concept that is important to an organization's DW

Approaches for DW requirements

- A data-driven (also called supply-driven): data source exploration that is designed to identify all existing data
- A process-driven: identifies the most important business processes that require measurement and control and then aligns these processes with corporate strategies.
- A goal-driven: emphasises the alignment of DW development with corporate strategies and business objectives and then translated into quantifiable key performance indicators (KPIs)
- A user-driven: underlines the involvement of end-users in DW development to determine required information from different business users.
- An externally driven: encouraging all involved parties to adhere to government regulations (e.g. central bank regulations for the banking industry) and conform to other types of external pressure (e.g. regulations for a publicly listed organization) that require real-time disclosure of business operations.

Data Driven

- A data-driven (also called supply-driven) approach (Oliveira et al, 2012; Niedrite et al, 2009; Artz, 2005; List et al, 2002) is a bottom–up technique based on data source exploration that is designed to identify all existing data.
- This approach attempts to construct DWs on the basis only of actually existing data in an operational system and disregards business goals and user needs.
- Organisational needs are unidentified or only partially identified.

Process Driven

- Essential business processes and indicators for measuring the processes are identified (Niedrite et al, 2009; Lujan-Mora et al, 2002).
- The needs of business are closely related and adaptive to a business environment (Guo et al, 2006).

Goal Driven

- A goal-driven approach is typically a top–down method that emphasises the alignment of DW development with corporate strategies and business objectives (Oliveira et al, 2012; Frendi and Salinesi, 2003).
- Different visions based on interviews with top management are then interpreted and combined to derive a consistent view. The obtained standpoint is eventually translated into quantifiable key performance indicators (KPIs) (Niedrite et al, 2009)

User Driven

- Involvement of end users in a DW projects to ensure the successful use of DWs (Niedrite et al, 2009).
- In user driven, DW tailored to users need

Externally Driven

- Revolves around encouraging all involved parties to adhere to government regulations (e.g. central bank regulations for the banking industry) and conform to other types of external pressure (e.g. regulations for a publicly listed organization) that require real-time disclosure of business operations (Frolick and Ariyachandra, 2006).

Subject Area

- Subject area is the common focus of requirements analysis as indicated in the case studies.
- Coverage of subject area is procedures, rules, and policies to organize the business in organisation.

DW Taxonomy

- The entire information taxonomy of a DW can be seen as a subject area in high-level information class (Guo et al., 2006), because 'subject' itself has levels. So, "subject->sub-subject..." can be seen as well as "country->province->city...".
- Empirically, the manageable number of the subjects for human is about 10 and less than 20 in every level.
- A large scale DW with about 1000 tables, classification using "subject->sub-subject->entity"
- but for medium scale DW consisting about 300 tables, is enough for using "subject->entity".

DW Requirements Technique

Req. Technique	Strengths	Weaknesses
User driven	• Involvement of end users is essential in a DW projects to ensure the successful use of DWs	• Unclear user understanding of DW, business strategies or organisational processes results in a high degree of schemata obsolescence • A considerable amount of time is needed in achieving a consensus on requirements, with participants having many different points of view
Data driven	• The fastest way to define a DW model • Simple • Very stable	• Such models may not reflect all the facts needed in analysing business goals • User involvement is limited • Multidimensional schemata produced cannot match user requirements if information is not available in a data source

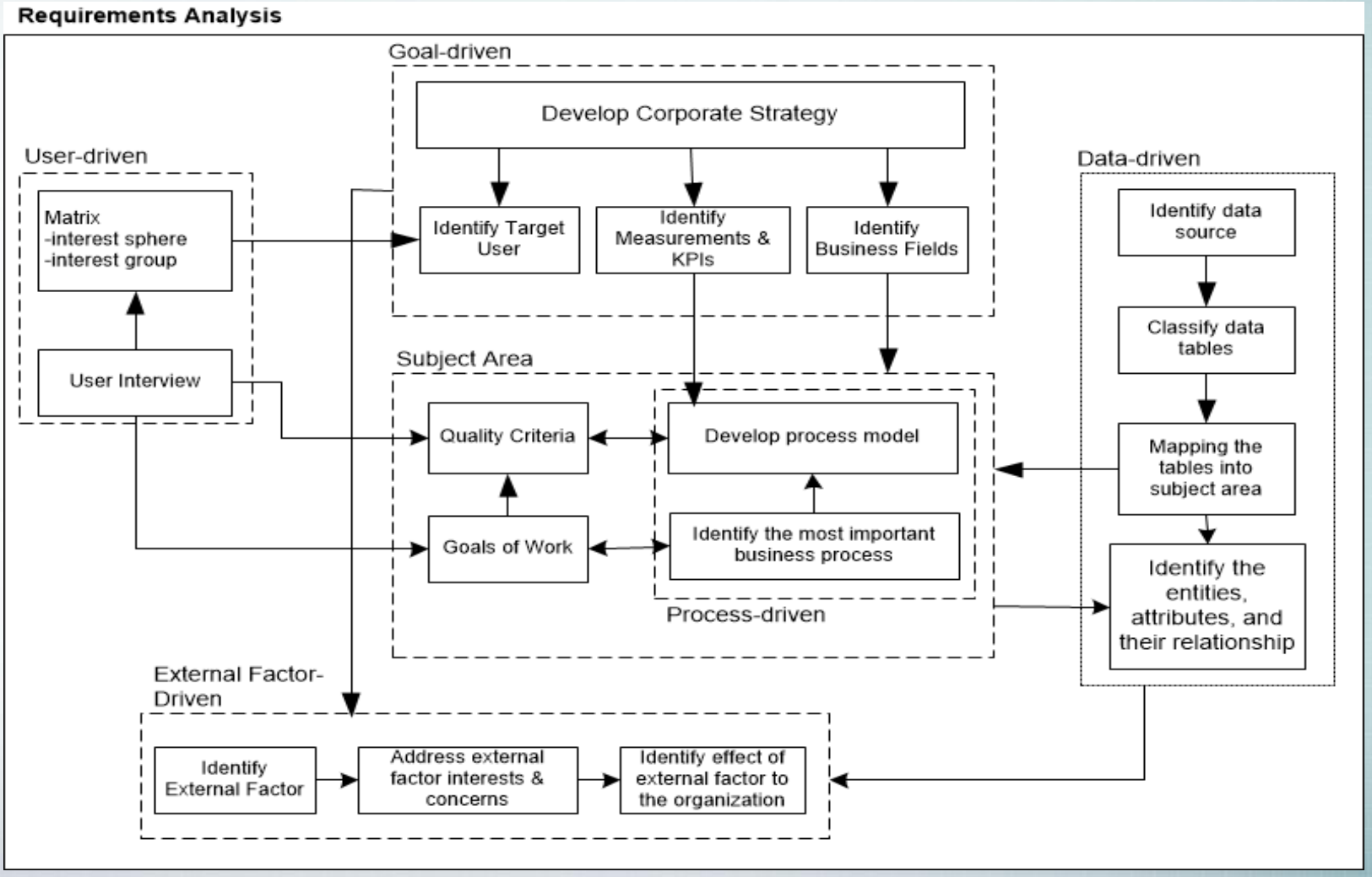
DW Requirements Technique ...

Req. Technique	Strengths	Weaknesses
Goal driven	Correct identification of relevant indicators can be obtained	• Very dependable in terms of encouraging participation from top management in the requirements analysis process Requires employees who are highly skilled in translating high-level requirements into quantifiable KPIs. • Predicting the needs of all senior managements is difficult to accomplish
Process driven	Essential business processes and indicators for measuring the processes are identified The needs of business are closely related and adaptive to a business environment	The model reflects business processes, not the process of decision making
External driven	Compliance with government regulations or other types of external pressure requires disclosure of business operations	Sometimes, external data is needed to generate required information.

DW Req. Technique…

- A number of approaches are usually integrated to obtain a data model that reflects the analytical needs of an organisation in a precise and appropriate manner
- All the approaches discussed above are complementary and should be used in parallel to realise optimal designs

DW Requirements Analysis phase



DQ-Based Req Analysis for DW

DW Development Phase	Input	Processes	Quality drivers	Tools	Deliverables
Requirements analysis → to discover the information needed to be maintained in the data warehouse					
• User driven	• Job description • Report analysis needed	• Stress involvement of end users in data warehousing • Aid users in identifying their analytical needs	• Soundness • Relevance • Process • Infrastructure (except maintainability)	• Interviews • Workshop • Prototyping • Scenario • Matrix interest sphere	**Facts** Focus of decision making **Preliminary workload** A set of queries, express according to a high-level language
• Goal driven	• Company profile • Official corporate document • KPI • Vision/ mission	• Elicits the information to be kept in decision support • Alligns DW with corporate strategy and business objectives	• Accuracy • Applicability • Consistency • Timeliness • Security • Speed	• Corporate Strategy • KPIs • Subject area	
• Data driven	• Existing Documentation • Database schema	• Re-engineer data source into a logical data schema • Re-organize the identified source schema to form DW models	• Comprehensiveness • Accuracy • Consistency • Correctness • Currency • Accessibility • Speed	• ER model • Class diagran	
• Process driven	• SOP (Standard Operating procedure) • Workflow processes	• Finding data sources used by the process • Conversions of data structures of business process into DW structure	• Accuracy • Consistency • Timeliness	SOM (semantic Object Model)	
• Externally driven	• Government regulation related to organisation • Standard value for the same industry	• Address external factor interest and concerns • Identify effects of external factor to the organisation	• Applicability • Consistency	Government regulation or other types of external pressure	

Data Quality Consideration in Req Analysis

- The lack of quality consideration in requirements analysis significantly affects DW benefits
- Requirements→functional and non-functional. Functional requirements → *what* data are to be stored
- Non-functional requirements → *how* to supply information to simplify correct reporting and analysis.
- Functional requirements → data-driven, goal-driven, user-driven and externally driven.
- Non-functional requirements can be process-driven

DQ Consideration…

- A scenario-based design method is very useful in determining the functionalities required.
- Scenarios can be used to systematically derive requirements because various situations can be easily exemplified.
- An additional advantage of harnessing the power of scenarios is that it eases the deployment of a DW because scenarios are clearly structured.

Summary

- Successful DW needs to be based upon good requirements analysis.
- A good quality DW can be triggered by a good quality of requirements analysis.
- Unfortunately, requirement analysis is often unclear and uncertain because of changing the requirements can be happened even in the short-term to accommodate the fast evolution of the business conditions.

Summary ...

- Subject area is the common focus of requirements analysis
- Coverage of subject area is procedures, rules, and policies to organize the business in organisation

Thank You !

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