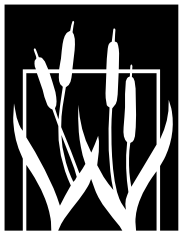

Whitemarsh
Information Systems Corporation

Resource Life Cycle Management
The Enterprise Architecture Component Integrator

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1. Objective

The objective of this paper is to present the Whitemarsh approach to the creation of Enterprise Resources, their life cycles, and the networks that naturally exist among the nodes of these Resources Life Cycles. Collectively, these Resource Life Cycle networks serve as an essential intersection and association mechanism for key enterprise architecture components. Once the enterprise-architecture components are joined through the Resource Life Cycle networks, an overall enterprise-architecture can be engineered, interconnected, executed, and maintained. The five key components of an enterprise architecture that are then interconnected are:

- **Missions.** Missions define the idealized and ultimate objectives of the Enterprise in terms of health care of children. Its missions are what the Enterprise strives to accomplish.

- **Business Organizations**. Organizations are the operating units of the Enterprise that need to be supported.

- **Business Functions.** Functions are the activities of the various staff acting in their positions and they accomplish the Enterprise mission.

- **Databases**. Databases in the broadest sense are the existing data that capture, analyze, update and report critical Enterprise data

- **Business Information Systems**. Business Information Systems that is, computer software based systems that support the automated aspects of the Enterprise and that, in conjunction with the databases capture and/or provide information to the Enterprise.

An issue that has plagued the development of enterprise architectures is how are all the enterprise architecture components interconnected? If, for example, it is to build databases and business information systems founded on Business Functions, function-specific stove pipe environments result. If databases and business information systems are founded out of organizations, organization-based stove pipes result. These will likely to be different from the function-based stove pipes. If databases and business information systems are founded on a longer-term and more solid foundation of enterprise missions, then, while this is clearly a step in the right direction, there will still be mission-based stove pipes.

In all three of these examples, the stove pipes will be different. Function-based stove pipes will be sensitive to the frequent business process changes. Organization-based stove pipes will be sensitive to changes in the “operational styles”of organizations which often change with leadership turnovers. Mission-based stove pipes are the most durable but depend on the fundamental ways the overall enterprise is perceived.

Needed is an enterprise-based intersecting mechanism that serves to interconnect, reinforce and eliminate duplication and/or unnecessary overlaps across both databases and business information systems, and of course, eliminates the unintended conflict and redundancy

consequences of the function-, or organization-, or mission-based stove pipes. Figure 1 shows the fundamental relationships among all the Enterprise Architecture components. This intersecting role is one of the key roles accomplished by Resource Life Cycle Analysis. There are other key roles as well, such as providing a business-sequence strategy for building and executing enterprise-level information systems plans, identifying the Resource Life Cycle nodes that have no Information Technology support, or too much, even redundant support, or conflicting support. In these roles, Resource Life Cycles serve as an enterprise-wide Information Technology efficiency and effectiveness identification, analysis, and remediation process.

First, Resources are identified and engineered directly from the enterprise, thus, they are independent of functions and organizations. Second, every Resource is squarely set within the context of enterprise-missions, thus they are longer lasting.

These mission-based enterprise-resources are accomplished via business organizations and their contained functions. The resources themselves are decomposed into their business-recognizable states that become the accomplishment objectives of business functions and

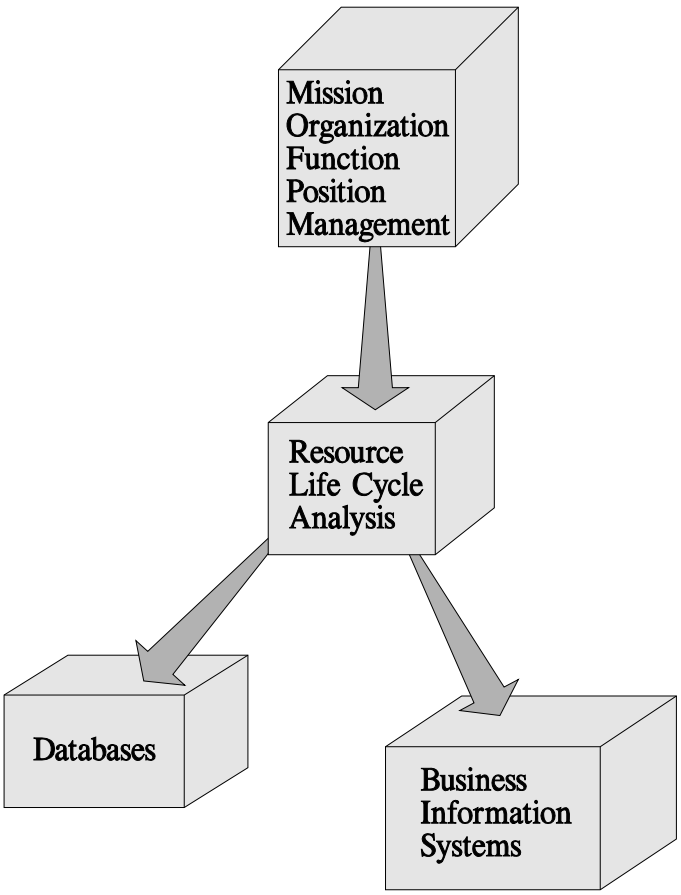

Figure 1. Resource Life Cycles as Enterprise Architecture Component integrator.

organizations. Each Resource Life Cycle node state is evidenced through the database data that is collected, processed and reported through business information systems designed especially to reflect the accomplished states.

In short, Resources and their Life Cycles represent the intersection mechanism across all the key components of an enterprise architecture.

2. Topics Covered

The topics is this paper include:

- Background
- Resource Life Cycle Objectives
- Building Resource Life Cycles
- Where Resource Life Cycles fit within the Enterprise
- Employing Resource Life Cycles Networks
- Real Benefit from Resource Life Cycle Analysis

3. Background

Ron Ross, a well known “data” consultant formalized his ideas about corporate resources and their life cycles in a 1992 monograph, *Resource Life Cycle Analysis A Business Modeling Technique for IS Planning*[1]. Resource Life Cycle (RLC Analysis) uses a form of business modeling to perform strategic information planning. Ross identifies the need for this type of planning because:

> "...It is therefore unreasonable to attempt to satisfy both dimensions of scope---i.e. "process vs. data"---in a single type of project. .I believe strategic planning should produce two types of projects --- one for "data" and one for "process". . . Scoping for each type of project is orthogonal---no attempt is made to satisfy both dimensions at once---so that the result is like weaving a fabric. . .Creating such a data-based infrastructure clearly requires early attention to data architecture for at least some of the "data" projects before any "process" project kicks off. That means pursuing high-level or "framework" entity modeling for at least some of the individual data projects. . . during or in parallel with the strategic planning phase."

In Ross’s parlance, “data” projects refer to those that exist under the Whitemarsh Knowledge Worker Framework column, Database Object, while “process” projects are those that fit under the Business Information System column. The Knowledge Worker Framework book can be obtained from the Whitemarsh website, www.wiscorp.com.

[1] The monograph can be obtained from Database Research Group, Inc., Boston, Massachusetts. ISBN 0-941049-01-9

4. Resource Life Cycle Analysis Objectives

The goal of RLC analysis is to build a bridge between the operational needs of enterprise Information Technology organizations and the strategic needs evidenced by enterprise missions, organizations, and their functions. The main goal of the strategic level is to identify, describe, and interconnect the major resources that are essential to the enterprise's survival. The RLC Analysis network can then be used by Information Technology organizations as the basis for planning, developing, delivering, and maintaining the various databases and business information that are essential to the enterprise in the most effective manner possible. RLC Analysis achieves this bridge goal by determining:

- The resource life cycle networks.
- The database and business information system projects and establishing their proper sequence for analysis, design, and implementation.
- A strategic view of the ongoing databases and business information systems development and major maintenance work.

RLC analysis determines three components of the resource life cycle networks, that is, the resource, life cycle and the precedence vectors between resource life cycles. A **resource** is an enduring asset of value to the enterprise. The **life cycle** is a linear identification of the major states that must exist within life of the resource. The life cycle of a resource represents the resource's "cradle to grave" set of state changes. The **precedence** is a vector that may occur between nodes on different resource life cycles, and thus indicates which resource life cycle node enables another resource life cycle node.

A resource is something of value to the enterprise. For example staff, facilities, equipment, computer hardware, networks, and other types of infrastructure. In the case of a hospital enterprise the resources would also include patients, families, treatments, lab analyses, doctors orders, and nurses notes. Included also are all financial assets such as liabilities, insurance policies, reserves, payments, receipts, accounts, contracts, grants, and the like. Finally included are abstract assets such as reputation, computer software systems, databases, policies, and procedures.

Enterprises operate through these resources. Every resource has a life cycle that commonly starts with a Need and then proceeds through stages of Creation, Evolution/Maintenance, and Retirement/Dissolution. At most of the stages of these resource life cycles, data is either employed, created, or deleted. This in IT is commonly called, CRUD. That is, create, read, update, or delete. The employment of the data is through databases (and their contained database objects), along with their associated business information systems.

Resource Life Cycles support the Information Needs, which, when satisfied, enable enterprise organizations to perform their functions associated with enterprise-missions. The Information Needs are the information-based evidences represented by an accomplished RLC

Analysis node. For example, a order from a doctor is evidence of the Doctor's Order. The treatment of a patient is the evidence that the treatment was performed and thereafter the results or findings.

It is important to know the resources and their life cycles because they ensure that there is a comprehensive set of information needs identified, specified, and allocated to the Mission-Organization-Functions. Additionally, the various stages of the Resource's life cycle provide direct linkages to the set of databases and business information systems of the enterprise. An analysis of resources and their life cycles, and also their related information needs, databases, and business information systems greatly assists in determining whether a complete and comprehensive set of data exists for enterprise databases and business information systems. Are there any holes, disconnects, or semantic conflicts? All these need to be known well in advance of establishing the funds and resources necessary for building enterprise databases and business information systems. If the holes, disconnects, or semantic conflicts are not resolved, then the "IQ score" of enterprise's intelligence will be quite low. Large quantities of funds and resource will have been wasted.

All the resource life cycle information and the interconnections to the databases and business information systems are stored in the Metabase System. These are printed in any number of ways and are reviewed by the stakeholders, revised, and made final. Findings related to holes, disconnects, or semantic conflicts are surfaced and presented to the appropriate staff at the Enterprise for action.

5. Building Resource Life Cycles

Resource life cycles are a key component in the planning, development, and evolution of Enterprise Database. Resource Life Cycles are properly identified subsequent to mission and database object analysis, and once created serve as a framework for understanding how all the databases and information systems from Information Technology serve the business.

5.1 Resource Identification

Subsequent to mission analysis and subsequent to database object identification, the resources of the enterprise quickly emerge. For a state-wide judicial court system environment, their resources included, Cases, Documents, Court Personnel, Calendars, Court Facilities, and the Law. Resources are typically a superset of the concepts represented by the database objects.

5.2 Resource Life Cycles

Each resource has a life cycle of state changes. The resource (at a minimum) is created, maintained, and terminated. Each resource state name represents a value-added accomplishment

of a significant set of business activities. Further, each accomplishment is significant with respect to the previous resource life cycle node in some way. The total sum of the functions for a resource is a "value chain" that comprises the life cycle of the resource. Figures 2, 3, and 4

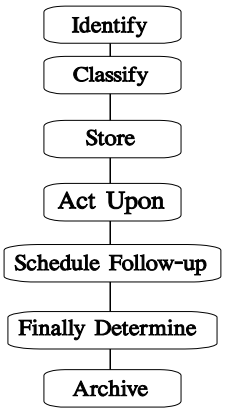

Figure 1, Resource Life Cycle for Document

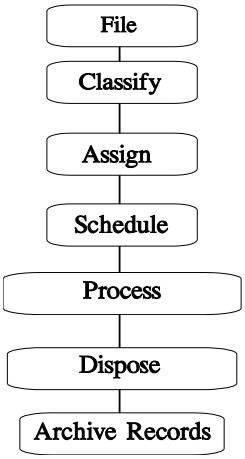

Figure 2, Case Resource Life cycle

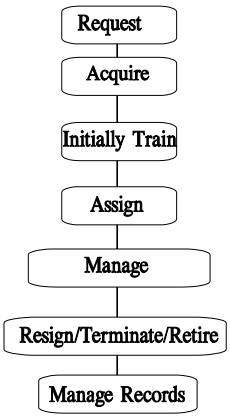

Figure 3, Courts Personnel Resource Life cycle

illustrate the life cycles for Document, Case, and Court Personnel.

5.3 Resource Life Cycle Networks

After the resources and their life cycles are complete, precedence vectors are established. There are actually two types of precedence vectors: Within the value chain and between resources. Precedencies *within* the value chain are established during the life cycle analysis. These are the lines that connect one node to the next.

A precedence between resources is created when a resource life cycle state, that is, a specific life cycle node, cannot be effectively or correctly done unless the preceding resource life cycle state has been established or completed. Precedence vectors are drawn from the enabling resource life cycle state to the enabled resource life cycle state.

The most difficult problem in establishing the precedence is the mind set of the analyst. The life cycle is **not** viewed in **operational** order, but in **enablement** order: that is, what resource life cycle state must exist before the next resource life cycle state is able to occur. This is a difficult mind set to overcome, as there is a natural tendency to view the life cycle in operational order. The test of precedence became: what enables and what is it enabled by?

For example, project establishment precedes the award of a contract. This does not seem natural, since a project would not operationally begin until after a contract is awarded. However, there must be an established infrastructure to create the project and to perform the work prior to the contract award. A workforce must be in place to perform work along with the ability to

assign work to the employee on the contract, and the ability to bill the customer. Therefore, the project enables the contract.

There are three possible meanings for enablement. That is, a resource life cycle state precedes another resource life cycle state because:

- The accomplishment of the preceding resource life cycle state saves money.
- The resource life cycle state leads to rapid development of another resource life cycle state
- The resource life cycle state permits faster, more convenient accomplishment of another resource life cycle state.

If one or more indicators exists, then a precedence vector should be created.

Two alternatives exist relative to the existence of the enterprise: newly established or existing. Experience shows the preferred perspective is that of an already-existing enterprise.

RLC states may or may not occur during a life cycle, or events may occur in parallel. For example, an employee may receive an award, but then again, may never receive an award. An employee may work before and after a security clearance is granted. The strategy to deal with parallel or optional RLC states is to create a single stream of RLC states in which none are parallel or optional by "pushing down" the parallel or optional RLC states to a lower level. Figure 5 presents the resource life cycle network for documents, cases, and court personnel.

6. Where Resource Life Cycles Fit within Enterprise Database

Resource life cycle analysis is a critical component of Enterprise Database. Resource Life Cycle analysis is however distinct from but complementary with business functions, databases, business information systems, and database objects, and information needs.

6.1 Resource Life Cycles and Business Functions

Resources and their life cycles are different from functions and function hierarchies. Resources are "noun" oriented, while functions are "verb" oriented. A typical function, human resource management analysis concentrates on identifying the activities that cause the human resources to be effectively managed. The identification of the high level functions, and then the detailing of

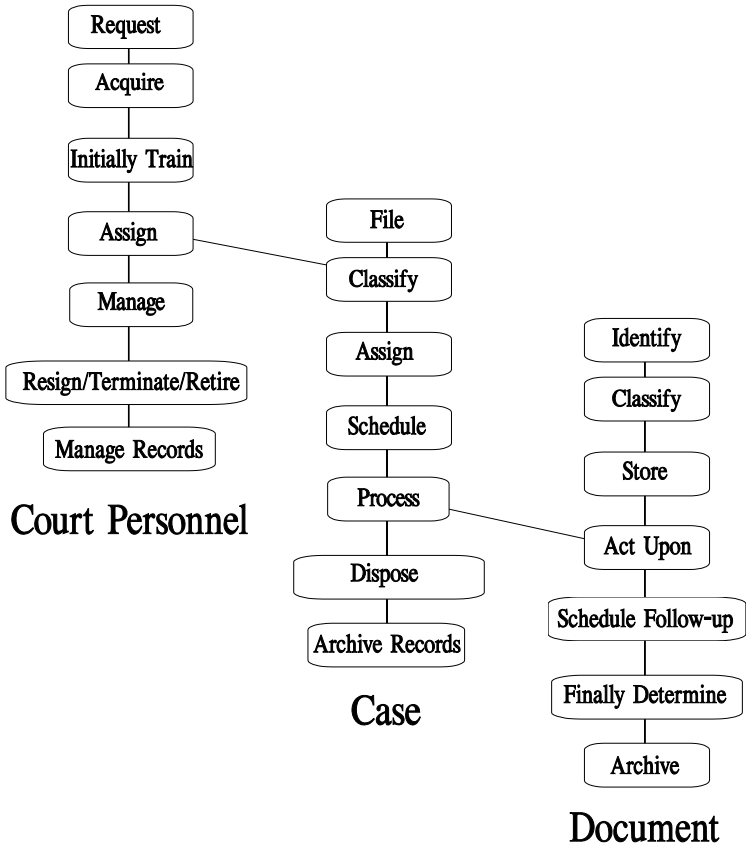

Figure 4, Precedence Vectors Among Resource Life Cycles

the lower level functions tends to become very personal. That is, "your" style of performing human resource management versus some else's.

The resource, the human, however is much more specific. First and foremost, it is a person. The resource life cycle analysis also concentrates on identifying the most critical phases or states in the life cycle of the human resource. This is significantly different from identifying the activities necessary to manage the human resource. In all essence, the resource is the "object" of the function-based activity. The total states associated with the human resource is most likely less than 15, while the total quantity of functions and nested levels of subfunctions could well exceed 100.

Resources and functions are interrelated, nonetheless. Figure 6 illustrates the relationship between functional hierarchies and resource life cycles. As the diagram shows, the relationship is not a precise mapping. Additionally, there could be multiple function hierarchies related to the same resource life cycle because functions are style and organization dependent while resources are sensitive to the style changes imposed by re-organizations and different managers. It is common for enterprises to have many different methods of performing functions against the

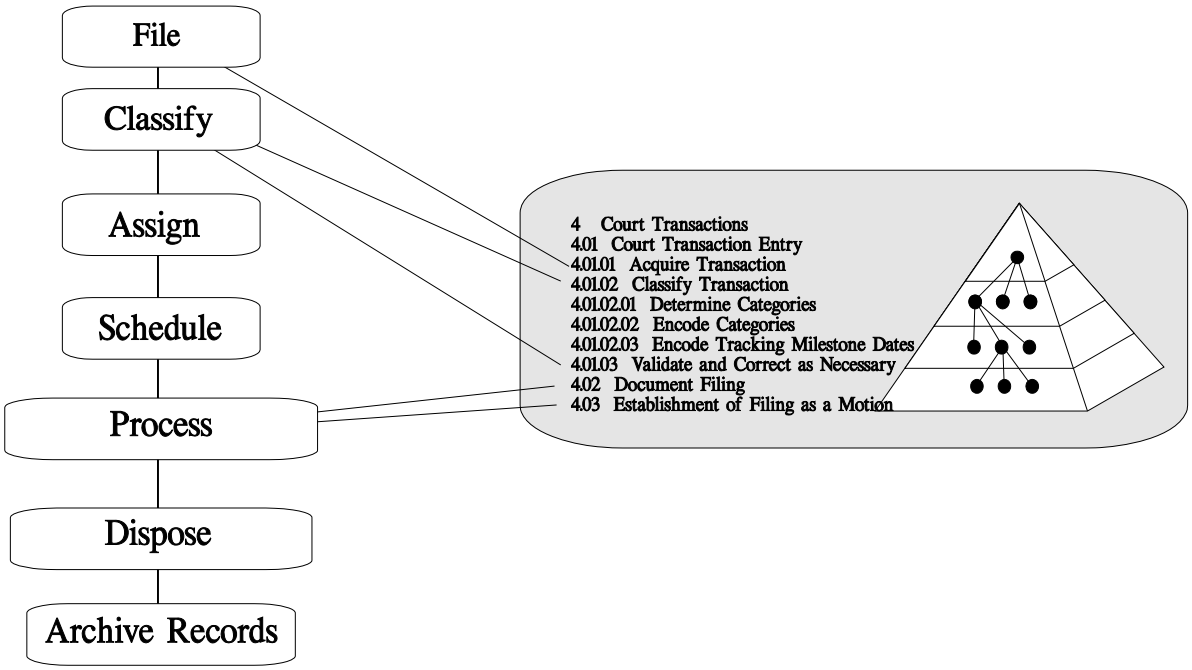

Figure 6. Relationship between Resource Life Cycle Nodes and Function Hierarchies

same set of resources. It is because of this imprecise mapping that functional hierarchies and resource life cycle nodes are related indirectly.

6.2 Resource Life Cycles and Databases

Figure 7 presents the relationship between databases and resource life cycles. Databases exist as instances of well-known data architecture styles from within the enterprise (see for example, the Whitemarsh paper on Database Architectures). In Figure 7, four of the six distinct styles are shown: original data capture, reference data, subject area, and wholesale data warehouse. These distinct database architecture styles are useful to illustrate that the data that supports a resource life cycle, may reside in different databases despite the fact that the data is generally all from the same subject area (i.e., court transactions). Data resides in different types of databases because of contextual uses. Initially the data is stored in an original data capture database as raw transactions. It is then transformed (if necessary) and stored with all other court transaction data in a subject area database so that it can be properly classified, set into context with all other related court transactions, processed, and finally disposed. Then as the cases leave their active status the data would be transferred to a wholesale data warehouse. Reference data serves as restricted value domains for data quality, selection, sorting, and the like.

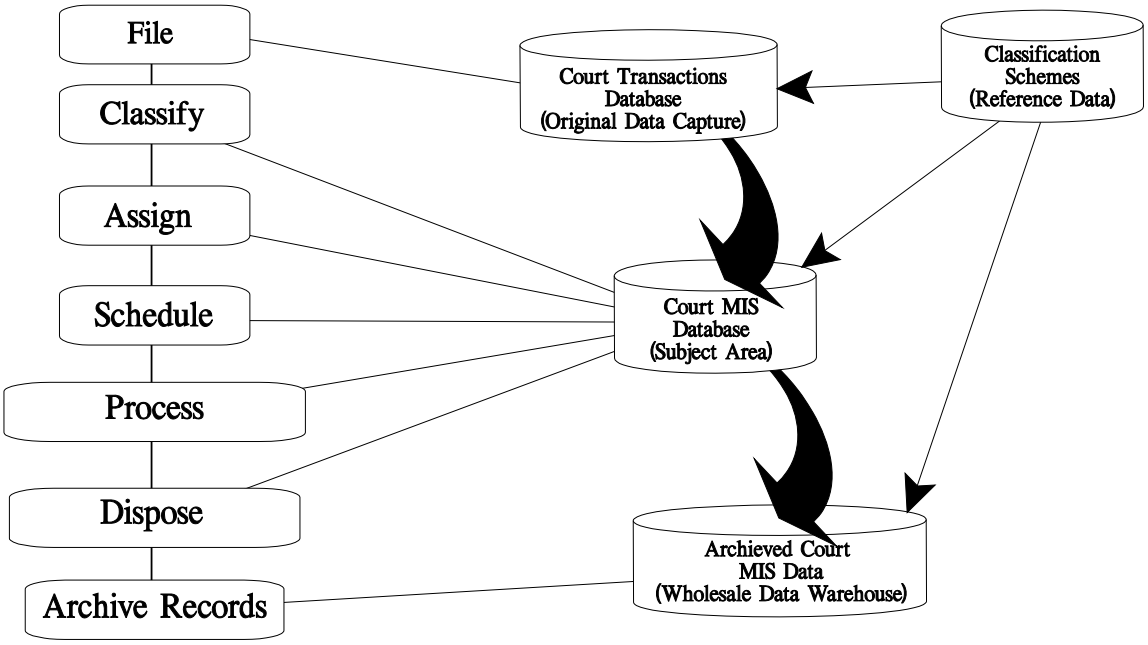

Figure 7. Relationship between Resource Life Cycles and Databases

6.3 Resource Life Cycles and Database Objects

Database Objects, fully described by materials on the Whitemarsh website, consist of four distinct components.

- Data Structure: The set of data structures (simple and complex collections of tables) that map onto the different value sets for real world database objects such as an auto accident, vehicle and emergency medicine incident.

- Database Object Process: The set of database object processes that enforce the integrity of columns (simple or complex), references between database objects and actions among contained data structure segments, the proper computer-based rules governing data structure segment insertion, modification, and deletion. For example, accomplishing the proper and complete storage of an auto accident.

- Database Object Information System: The set of specifications that control, sequence, and iterate the execution of various database object processes that cause changes in database object states to achieve specific value-based states in conformance to the requirements of business policies. For example, the reception and database posting of

data from business information system activities (screens, data edits, storage, interim reports, etc.) that accomplish entry of the auto accident information.

- Database Object State: The value states of a database object that represent the after-state of the successful accomplishment of one or more recognizable business events. Examples of business events are auto accident initiation, involved vehicle entry, involved person entry, and auto accident DUI (driving under the influence of alcohol/drugs) involvement. Database object state changes are initiated through named business events that are contained in business functions. The business function, auto accident investigation includes the business event, auto-accident-incident initiation, which in turn causes the incident initiation database object information system to execute, which in turn causes several database object processes to cause the auto accident incident to be materialized in the database.

Database objects are the specifications that ultimately form the semantics of the databases that DBMSs use to store, update, access, and report data. There is therefore no direct relationship between database objects and resource life cycles. The indirect relationship is that database objects are the technology independent specification of the databases that provide the data to the nodes of life cycles. Figure 8 illustrates this indirect relationship.

6.4 Resource Life Cycles and Entity Life History

Entities are generally another phase for an implemented database table. Most often, entities are seen as conceptual objects that have names, and a collection of attributes and definitions. Over the past several years, the concept of an Entity Life History has arisen. What is recorded in Entity Life Histories is information critical to the formally defined state changes to an entity. For example, if there is an Employee entity, it's life history might be:

- Employee creation
- Employee modification
- Employee deletion

Within the concept of an employee, there might be the employee's name, biographic information, address information, assignment information, benefits information, education information, separation information, and education information.

The problem with the list just posited, is that most of these collections of information are entities in their own right. Thus, what should have been identified, design, created, and evolved are database objects. That's because like Employee's, database objects can have complex data structures, formally defined processes, state specifications, and transformations.

Thus, articles and presentations about Entity Life Cycles or History should really be about Database Object Classes.

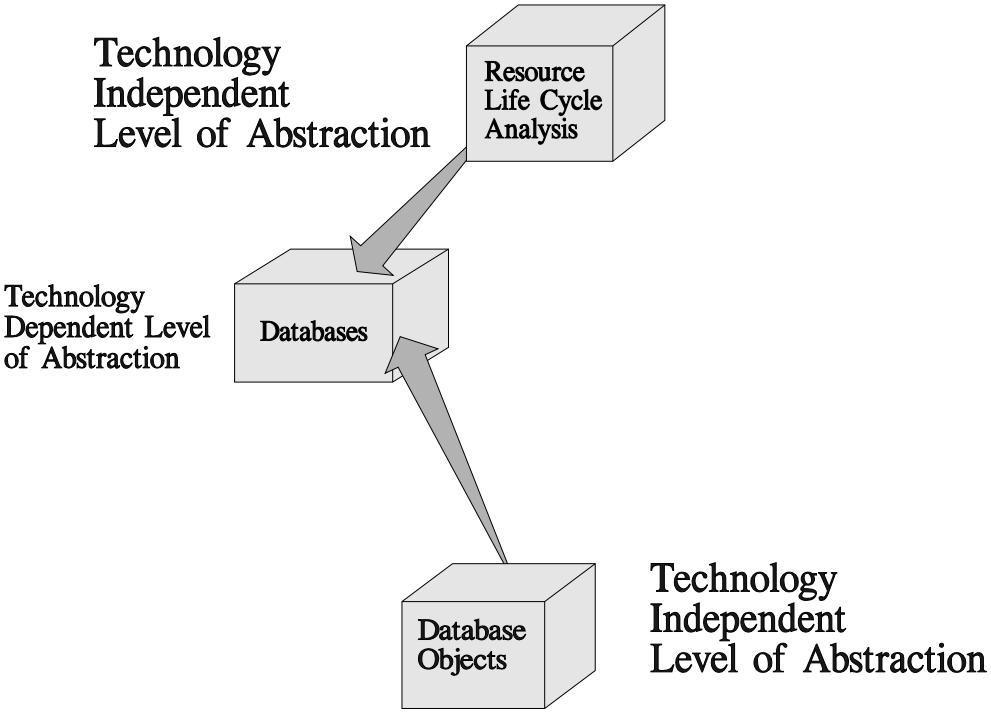

Figure 8. Interrelationship between Resource Life Cycles and Database Objects

6.5 Resource Life Cycles and Business Information Systems

Business Information Systems are the mechanisms for acquiring data from databases in support of resource life cycle nodes. Since few enterprises have incorporated well engineered resource life cycles as the basis for selecting and accomplishing information technology projects, existing business information systems commonly support multiple nodes withing one resource life cycle and even nodes from different life cycles. This common situation is illustrated in Figure 9. Ideally, once an enterprise settles on its resource life cycles and then re-partitions of information systems according to resource life cycle nodes, most information systems will be confined to just one node.

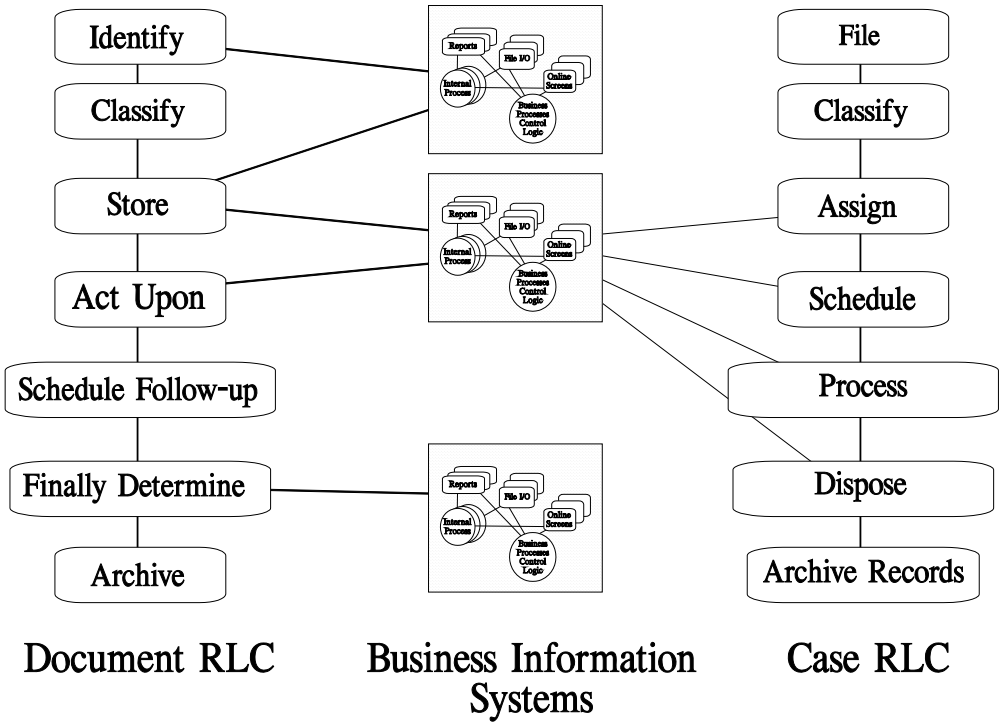

Figure 9. Interrelationship between Resource Life Cycles and Business Information Systems

6.6 Resource Life Cycles and Information Needs Analysis

Information needs are introduced here as the mechanism to explicitly set out the "what" which is needed by the positions within organizations that are accomplishing the mission-based functions. Information needs may span different Resources Life Cycle node supports. For example, producing the information needed about a Court Document Filing, the current status of a Case status, and knowing the personnel assigned to work on the case. Each of these classes of information would be defined as separate Information Needs, but would be created by one or more Resource Life Cycle Nodes through the related databases and business information systems. The introduction of Information Needs is not a complicating mechanism, but a smoothing and redundancy and/or conflict elimination mechanism.

Resource life cycles and their contained nodes clearly represent well bounded decision domains in support of an aspect of the enterprise. The data necessary for the resource life cycle node is obtained from databases through the business information systems. These data represent the information needs of persons as they perform functions within distinct organizations in support of accomplishing enterprise missions.

Since there are many different information needs and since these information needs may not cleanly map to just one resource life cycle node, the relationship is indirect. That is, there may be a single information need that requires "data" from multiple resource life cycle node related business information systems. And, there may be many different information needs mapped to just one node. Figure 10 illustrates this interrelationship and the interelationship between information needs and various missions, organizations, functions and persons.

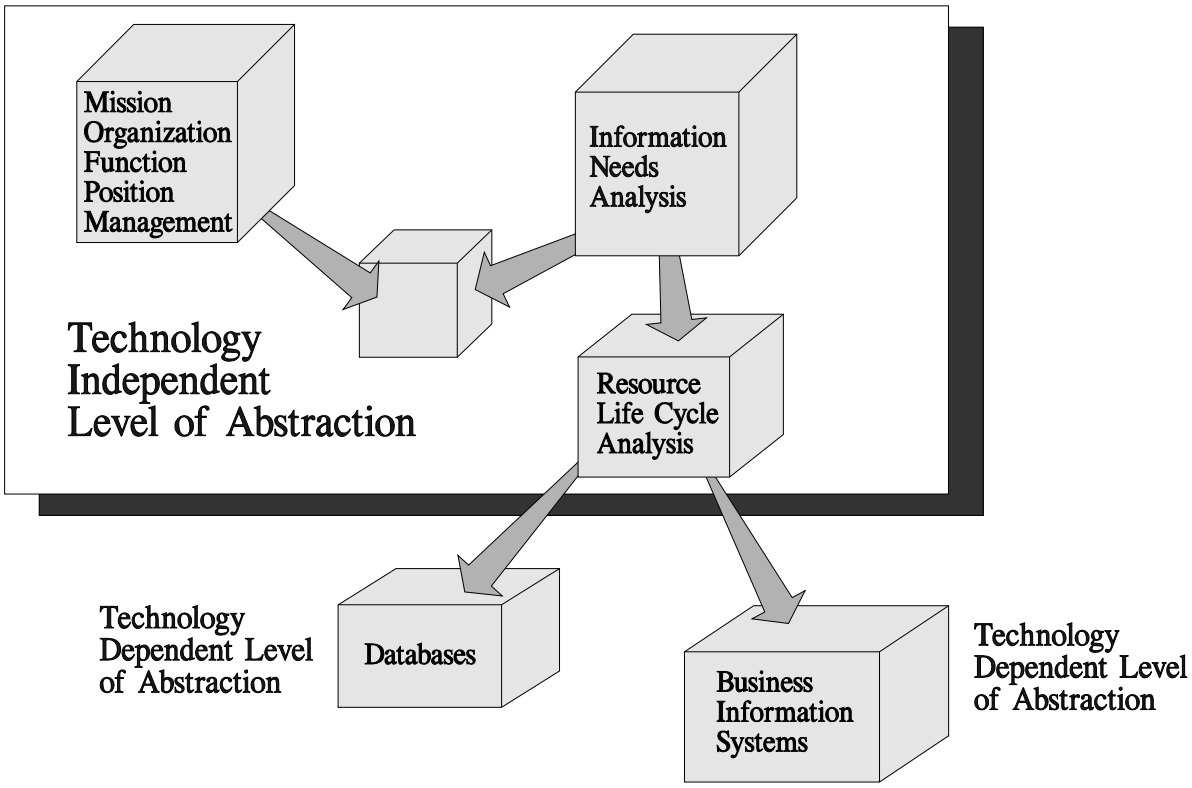

Figure 10. Interrelationship between Resource Life Cycle Nodes and Information Needs Analysis supported by business information systems, databases, and various missions, organizations, functions, and position management.

6.7 Resource Life Cycles and Enterprise Database Summary

Resource Life Cycle analysis acts as a critical framework upon which to attach and thus interrelate key components of enterprise database. Through Resource Life Cycles the following can be interrelated in a non-redundant fashion:

- Mission, Organizations, Functions, Position Management Levels
- Information Needs of these Missions, Organizations, Functions, Position Management Levels
- Business Information Systems
- Databases (and in turn, database objects and data models)

Figure 11 illustrates these interrelationships at a gross level.

7. Employing Resource Life Cycle Networks as Basis for Enterprise IT Project Management

The resource life cycle network, as depicted in Figure 5 represents the enterprises' need for information in an enablement order. Because there is a network similar to a project management systems's PERT network, information technology projects can be staged to be accomplished in the RLC network order. The RLC network thus represents a natural network for accomplishing projects.

The RLC networks serves as a very useful framework for allocating existing databases and information systems. The RLC network gives IT organizations the ability to answer questions such as:

- What IT projects address a particular segment of the enterprise?
- What business resource is served/enabled when one project be started and completed before another?
- What IT projects are largely redundant one with another?
- Which segments of the RLC networks are either under or over served by IT?

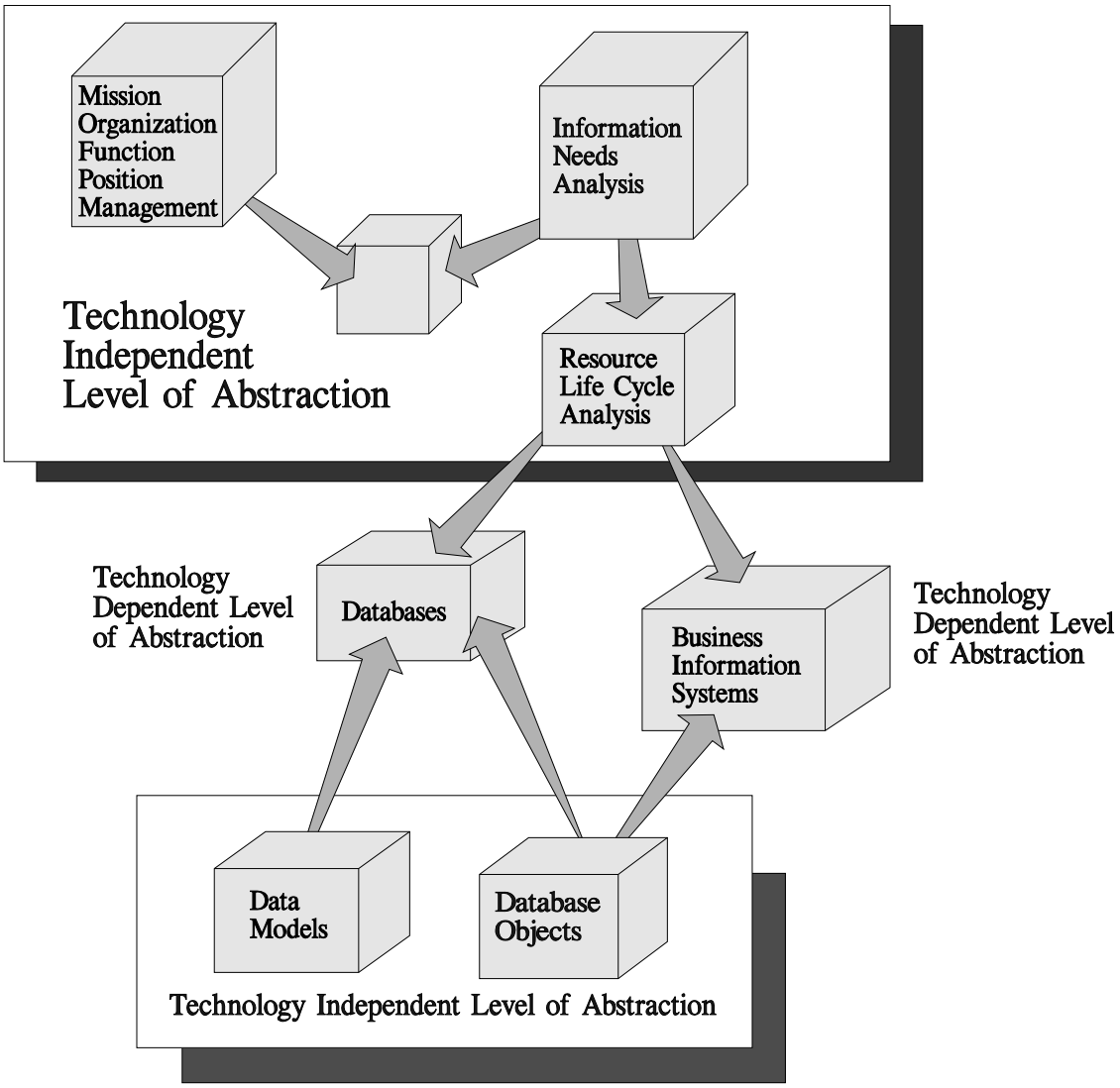

Figure 11. Interrelationships between key components of enterprise databases and Resource Life Cycles.

Figure 12 shows that there are multiple systems allocated to several of the RLC nodes. Analysis should be performed to ensure that the semantics of these systems are either not at cross purposes or completely redundant. If redundant, then elimination should be considered.

As IT projects are proposed, their required resources (i.e., staff, time, hardware and software) can be quantified in terms of the difference between the existing and proposed state of IT assets allocated to the RLC node. Project estimating for technology improvement projects can be greatly improved when standardized project methodology templates are associated with these proposed projects. Finally, if metrics have been kept on past efforts, realistic estimates of efforts can be quickly determined.

When all the IT improvement projects have been identified and estimated, the very fact that they are allocated against the RLC network enables them to be scheduled through a project management system, en mass.

8. Real Benefit from RLC Analysis

The value to the Enterprise is the detailing of the information needs of the various providers and uses of information within the Enterprise. Detailing these needs leads directly to the creation of a valid and immediately useful database designs and business information systems.

There are five distinct values from the Resource Life Cycle Analysis. First, Resource Life Cycle Analysis enables the identification, and specification of the major transformation

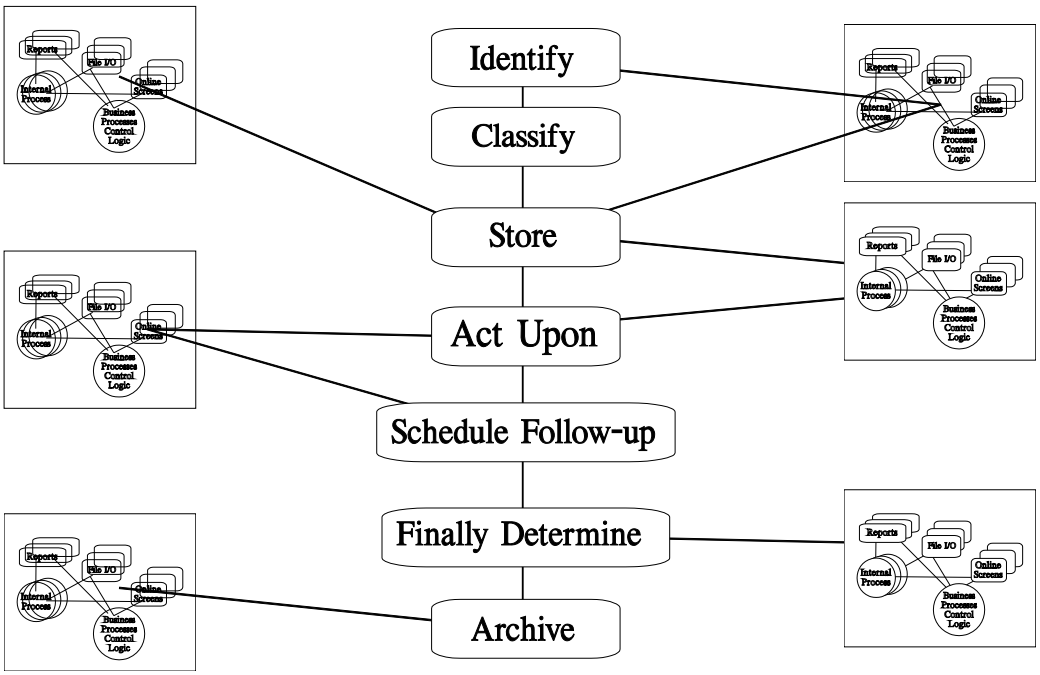

Figure 12. Allocated Information Systems to RLC, Case

states of Enterprise resources, such as for a hospital, its medical treatments, records management, research, patient tracking, care plans, and the like.

Second, because of the formulated Resource Life Cycles, relationships can be created between different life cycles that, in turn, show dependencies and precedence. What were simple lists are now the networks that conform to the realities of the enterprise.

Third, Resource Life Cycle Analysis enables bridges to be created and built between databases and business information systems on the one hand, and the information needs on the other hand that are necessary to staff within positions of organizations whose functions are accomplishing the Enterprise missions.

Fourth, Resource Life Cycle Analysis enables the identification and description of a lack of database and business information support for the critical transformations of a Enterprise resource from one stage to another. Breaks in database and business information support often cause redundant information to be created, different names for the same data, or the same names for different data, and finally differences in precision, granularity, and timeliness.

Fifth, because of the Resource Life Cycle networks, valid, reliable, and repeatable time and business cycle dependent business cycles can be established that will be critical for the population and maintenance of database. For example, in the hospital example from above, suppose it takes three days for a treatment order to get to the database because there is a manual data posting process, but only one day for treatment execution results to be captured and posted. Without the Resource Life Cycle Analysis network, the treatment results might “arrive” before the treatment order. That would cause a data warehouse loading error.

All of these problem areas are potentially identified through Resource Life Cycle Analysis and are then opportunities for the Enterprise to resolve these breaks and thus make data warehouse data more uniform and semantically harmonious.

Under the presumption that the result of the en mass scheduling is normal, that is, a requirement for an infinite amount of time coupled with infinite resources, the real value of RLC analysis comes into play.

Because the RLC network is a reflection of the essential business resources, their life cycles, and the interactions among the life cycles, business analysts and managers quickly grasp its significance. It represents the business. Playing secondary and supporting roles are all the databases and information systems, as they should.

So, when infinite corporate resources are not available, the RLC networks enable the “problem” to be put back where it belongs: squarely on corporate management, who cannot then avoid answering the three critical questions:

- What needs to be done? (That’s expressed as the allocated databases and information systems agasinst the resource life cycle nodes.)

- When is it appropriate to do it? (That’s expressed through the enablement vectors.)

- Why does it benefit the enterprise? (That’s expressed as the resources and their life cycle nodes.)

The only question left for the IT staff is, "How will it be done?" This question is commonly answered through packages, custom development, and code generators, or not at all. As each "how" is answered and/or refined, the effects of the answer should be expressed as changes in resource requirements for the IT projects allocated to the nodes. Once changed, the entire enterprise-wide RLC-based IT project set can be re-estimated. This process is iterated and re-iterated until a least-unobjectionable solution is found.

Once the information systems plan has been agreed-to and signed-off by management, the plan can be quickly and easily revisited whenever technology changes, packages are discovered, or code generators, repositories and CASE tools are obtained.

9. Summary

RLC analysis enables business mangers to participate in the identification of the resources, their life cycles, and then enablement vectors among the life cycles. The IT staff then has a business management defined network against which it can allocates the existing information systems and databases. Once allocated, IT can root out the conflicting and redundant systems and databases. IT projects representing advances in the sophistication of its support to the business can be identified and resource-estimated through standardized methodologies and metrics. Once the set of IT projects are estimated, the entire enterprise-network of IT projects can be scheduled through project management software. At that point, management re-enters the picture and makes the hard choices, what, when, and why. IT is left with the How. That's how it should be.

10. References

The following references to Whitemarsh materials provide a more detailed exposition practical application of the significant content of this paper.

The following documents are available free from the Whitemarsh website:

Paper	URL
Information Systems Planning: Book, Course, and Presentation (short and long) – samples Knowledge Worker Framework: Book, Course, and Presentation (short and long) – samples	http://www.wiscorp.com/EnterpriseDatabase.htm
Database Architecture Classes: sample	http://www.wiscorp.com/DatabaseDesign.htm
Resource Life Cycle Analysis: Paper	http://www.wiscorp.com/MetabaseProducts.htm
Database Project Work Breakdown Structure – sample	http://www.wiscorp.com/DatabaseProjects.htm

Paper	URL
Resource Life Cycle Analysis Metabase Module User Guide	http://www.wiscorp.com/metabase_demo.html
Metabase System (Free Version) Request form	http://www.wiscorp.com/freemb.html

The following documents are available for Whitemarsh Website Members. The URLs that follow provide descriptions of the pages. Members should log in and proceed to the appropriate page, e.g., Enterprise Database, find the book, paper, or course and perform the download.

Paper	URL
Information Systems Planning: Book, Course, and Presentation (short and long) Knowledge Worker Framework: Book, Course, and Presentation (short and long)	http://www.wiscorp.com/wwmembr/mbr_products_edb.html
Database Architecture Classes	http://www.wiscorp.com/wwmembr/mbr_products_dd.html
Database Project Work Breakdown Structure	http://www.wiscorp.com/wwmembr/mbr_products_dp.html