

Emerging Paradigm in Business Transformation through innovative Information Technology

Dr. Sharad Raghuvansh

Abstract-Transformation has become the necessity for any organization's survival and growth today for its innumerable benefits, the vital aim being competitive advantage. Organizations are under immense pressure to adopt the process of changing trends and evolving technologies to keep pace with the competition according to process, people and tools. Every transformation requires thorough study of each business driver where phenomena of basic three-tier architecture are common in key drivers of the business i.e. process, people and tools. A business transformation can only be achieved by having clarity of the business model comprising of each business processes within the organization. This article emphasizes upon the transformation by utilizing the capabilities in implementing Information Technologies (IT) as tools through people as process based transformation to bring in phenomenal growth of business in the business world.

Key Words : Transformation, Business Logics/Process, Business Elements/Components/Units, SOA, Managerial hierarchy, RDBMS/DBMS, Three-tier/n-tier Architecture.

I. INTRODUCTION

The phenomena of transformation taking place through introducing new advanced information technology(IT) into the organization. Transformation in business could be for major or minor change or even for refinement of existing business processes in a system/organization. The key drivers of business are process, people and tools are discussed separately in this article and then focuses on a common phenomena of three-tier architecture between these three.

Continuous research within information technology leads to ongoing process of transformation as innovation which are taking place within business organizations around the world. Though BPR(Business Process Reengineering) does gets into vast study in improving business processing apart from this there are few grey areas where study made in this article that there is a common three(n)-tier architecture focuses on how transformation is taking place within the business process in business elements using three(n)-tier architecture. Enterprise Resource Planning(ERP) of System Analysis and Processing(SAP) used in mapping business logics interlinking and integrating business components, now days it has become successful tool in transforming business.

This three-tier and n-tier architecture is used in Managerial hierarchy, RDBMS(Relational Database Management System) and SOA(System Oriented Architecture), in RDBMS it is all about effectively and efficiently managing and accessing data, whether data are stored centralized or distributed servers. SOA deals with connectivity from applications from users to server even if they are geographically apart and within managerial hierarchy are mapped through the above mentioned technologies of RDBMS and SOA. Such type of connectivity using SOA is widely used in Business Intelligence for Data Warehousing and Data Mining. Even a single transformation at one place in the process using any kind of tool will affect the efficiency of the business. People working in any organization are to be molded in preparing and boosted for change.

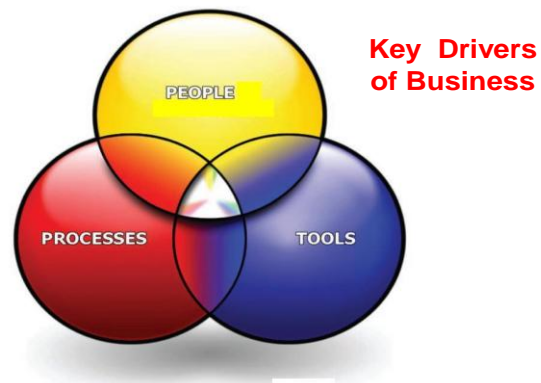


Figure-1.0

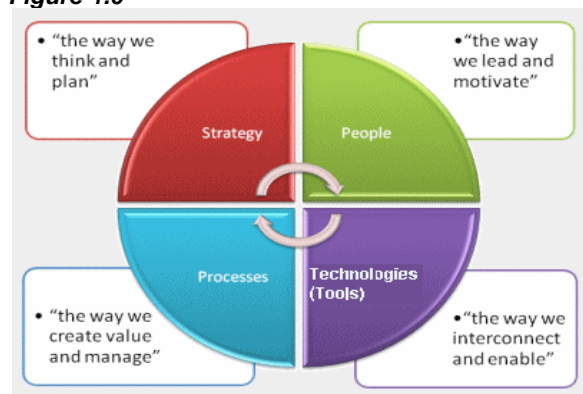


Figure-1.1

II. Introduction to Business Elements and Processes

This article first studies the business elements/units where business process takes place in which IT transformation finds its scope for change as given below.

1. **Material Management :** In this business element all kinds of production planning and control are achieved before production. Major functions include purchasing, accounts payable, fixed assets, and inventory which are completely integrated within the Materials Management system, as well as with the general ledger and budget control process[1]. Under this business element few broad business process are like market schedule plan, purchase(procurement) mode of transportation (logistics),stock(raw-material), etc.. The processes above mentioned are defined scope area where IT could transform these processes for all kinds of beneficial improvements.
2. **Production :** In this business element business processes are like schedule planning, capacity planning , Quality Control, batch processing, continuous processing, assembly line, production process planning, Computer-Aided manufacturing (CAM), generation of shop floor work instructions, time and cost estimates, Quality Computer-Aided Quality assurance (CAQ), [2]etc where dependency is too much on computer softwares as RAD(Rapid Application Development).

3. **Warehouse :** In this element of business where finished product after production it stores and manages goods. Logistics is the key process comes into action for transportation mode for bringing in finished products from production department, storing and sending it to next business element sales and distribution. Transformation will made in this unit will be for - Reduced Labour Resource, -Improved Materials Flow, - Improved Warehouse Layout , - Improved Warehouse Design, -Reduced Inventory, -Reduced lead-times, - Improved process efficiency, -Reduced Capital Costs, - Improved Service Levels, -Easy on floor management, - WMS effectiveness, -Management understanding of the real cost drivers, -More efficient Warehouse operation[3].

4. **Sales and Distribution :** In this IT finds it's place as a huge scope. In this process like pricing, promotion, product configuration, packaging, cost & profitability, competition, invoicing, order & delivery, payment(terms & mode), commission, revenue, compensation, services after sales, push and pull factors, market survey, trade(Terms & condition), etc.[4]. Whereas selling out product in the market is totally dependent on various distribution channels for Producer-Agent-Wholesaler-Retailer-Customer for such business processes regular changes are required and IT as it's key tool as it has to maintain customer management processes(and also CRM i.e. Customer Relation Management Level) which is also considered to be a separate component as Customer Service & Satisfaction. One of the key area is Supply Chain Management(SCM) which has certain processes involved for overall business units involved in business such as Customer service management process, Procurement process, Product development and commercialization, Manufacturing flow management process, Physical distribution, Outsourcing/partnerships, Performance measurement, Warehousing management. This SCM also is covered in ERP software.

The route taken by goods as they move from producer to consumer is known as Channel of Distribution.

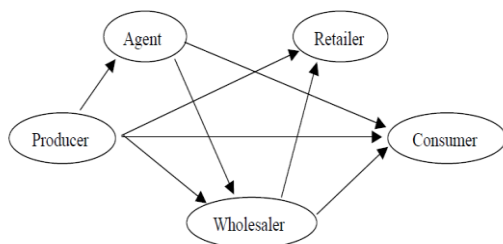


Figure-2.0: Source [5]

5. **Retail Management :** Every industry to reach out to customer has to manage retailers as this phase acts as an interface between the industries and customers or consumers. This business unit is one of the strong and traditional distribution channel in sales for any industry for their business. Retail industries work according to the marketing strategy developed by the Sales & Distribution companies of the related products. There are various types like Department stores , Variety stores , Specialty stores, Supermarkets, Super Bazar , Malls, E-tailers etc. which are mostly of Food products, Hard goods ("hardline retailers") - appliances, electronics, furniture, sporting goods, etc. Soft goods - clothing, apparel, and

other fabrics. There are various ways through which customers receive their products with the process involved such as Counter service, Delivery, Door-to-door sales, Self-service[6-7].

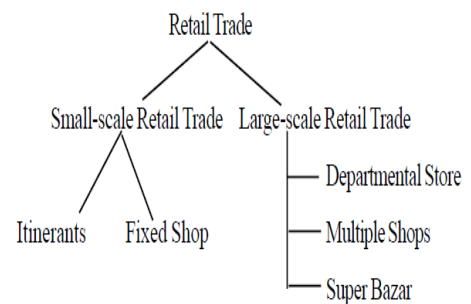


Figure-3.0

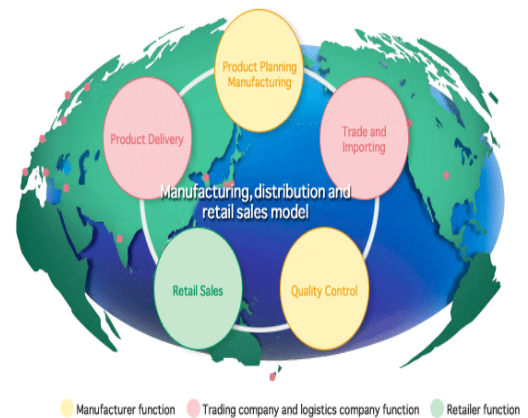


Figure-3.1

6. **Customer Service & Satisfaction :** These days industries are aware of the competition in market is only in capturing customers. Every industry realizes the importance of customer service & satisfaction and that is why the nomenclature of CRM (Customer Relationship Management) has come into notice and ratings of levels are being done according to it of any industry. This has created a heavy competition among the industries as how much product related facilities or services creates satisfaction among customers[8].The main cause of transformation is to increase and maintain CRM rating under the satisfaction of customers.

7. **Human Capital Management :** This is one of the key business driver which plans and manages employees from recruitment to their development and performance evaluation where IT gives it's helping hand to this section for any organization. Where acceptance and adaptation to transformation part plays a crucial role rather this unit takes up the requirement and makes the each level in managerial hierarchy prepare and attract staff for change and train within the organization.



Figure-4.0 Source : Website of University of Western Australia(Human Resource)



Figure-4.1: BUSINESS TRANSFORMATION

III. Computer Software Technologies used for Business Processes

By studying the above mentioned business elements and processes we find the enormous scope for IT and Technologies to incorporate and update development in routine basis for any organization in the competitive business world. Studying such kind of business scenario IT industries have been involved in researches for developing certain specific software involved in the above mentioned business process such as Mikrofax eProcurement, SAP, ERP, Oracle, Tuppas Quick Schedule, Mosaic D21 Distribution Software, InveTrak, ASC Trac, TECSYS WMS, 3PL Warehouse Manager, Celerant Command Retail, Iridium Retail Manager, Retail Pro, QuestionPro, Surveygizmo, salesforce, esurveyspro, zoomerang, etc. which keeps on transforming such business processes and even today enhancing it as a continuation process. This article studies such process based transformation within industries.

IV. Introduction to three-tier and n-tier architecture Technology for Business Transformation

The key area of process based transformation studies of this article covers in three phases first as database management system, second system oriented architecture and managerial hierarchy in all the three phases the three-tier system is followed. In three(n) tier architecture technology has enriched according to improve speed, accuracy, security and efficiency for continuous enhancement of any organization to establish themselves to capture the global market. The advancement of technology in three/n~ tier is utilized in these two phases mentioned below:

- 1) In first phase development related to storing and managing centralized or distributed databases, within organizational tasks which is being implemented to achieve most of the process for compiling and accessing huge database and generating multiple reports with robustness per day which in earlier days took almost months or years.
- 2) Second phase is in communication technology helped in assimilating and disseminating information within or from outside organization with reliability according to the need related to the organization, which is commonly known as SOA (System Oriented Architecture) on networking.
- 3) Third phase is managerial hierarchy where Human Capital Management study is carried out. The architecture is as with top level management, middle level and lower level management which is discussed in the article latter.

Till now we got to know about business elements or components also known as business units each have their own business logic

when implemented known as business process and there implementation through various technologies platform used to benefit the business world as discussed further.

V. Three-tier and n-tier System Architecture used in Relational Database Management System

There are three-tier layer architecture from the arrival of DBMS concept as 1) User Layer, 2) Conceptual/Logical Layer and 3) Physical Layer. Before this there was two-tier concept which used to have multiple drawbacks of security, data redundancy, connectivity etc. and to overcome several such drawbacks this three-tier architecture was developed with middle tier as conceptual or logical layer which converted these drawbacks into advantages and in real sense this layer was the DBMS. As, the continuous development was made in networking technology which lead to develop this DBMS architecture further to facilitate networking technology for communication. This advance development followed almost the same architecture as of communication technology.

The advance three layer architecture contains first layer as Presentation Layer which has several Object created as request or requirements demanded by the users, In business Layer represents as programs which are business objects to be executed as business process developing internal, conceptual schemas in accessing Data Access Object from third layer Data Access Layer. This architecture is represented in the figure given below in terms of Objects-based which are being interlinked and generated at different layers request of process generated from Presentation Layer to Data Access Layer to access and revert back to the Presentation Layer as desired output reports to the users[9].

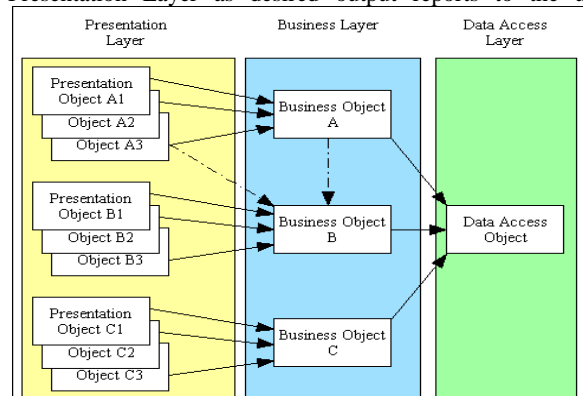


Figure-5.0: Source: Rapid Application Development toolkit for building Administrative Web Applications[9]

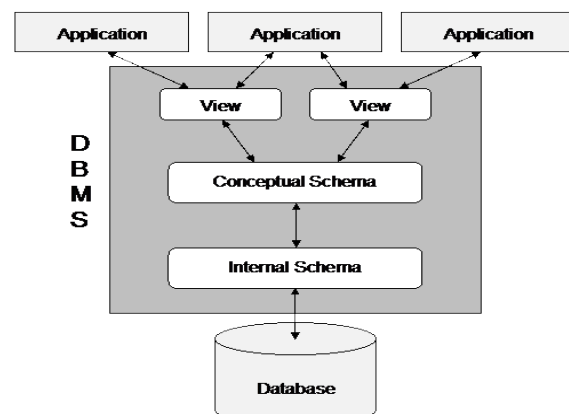


Figure-5.1: Source: Rapid Application Development toolkit for building Administrative Web Applications[9]

The above three-tier architecture in Fig.5.0 & 5.1 is Object-based but getting into more elaborated study to know about the

technologies being used for GUI (Graphical User Interface:RAD) applications are as Web-based GUI i.e. HTML, DHTML, XHTML etc. all taken as web services for client-tier which all functionality is to get connected to the second layer known as Application Tier where numerous servers might work at large scale to entertain users around the world. These application tier are created by application programs using the technology platform such as of Microsoft ASP.NET in C# and DCOM, JAVA in Servlets and CORBA, etc. to interlink between front end design of RAD(Rapid Action Development) programs made up of mostly using VB(Visual Basic), C#,Java,C++,C,etc. to backend (database) like ORACLE, MSAccess, DB2, SQL Servers,etc. this is the third layer of Database Tier which manages data in the data storage devices as data source.

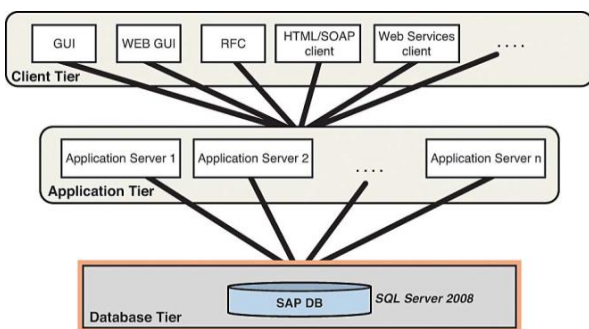


Figure-6.0:Source: SAP multitier architecture with SQL Server as the database layer [10]

VI. Three-tier and n-tier Architecture used in Communication Technology

The term three layer/tier architecture as presentation layer for the users/clients which are of various types from different levels of managers within the organization or customers for that organization on different types of computer network follows client-server architecture. Each of these users/clients use different kinds of platform onto their computer system for their application programme interface(API) for output display through Window Communication Foundation (WCF) according to the requirement as command is given by the users/client, this is performed by the second layer i.e. Application Server. WCF development is through various technologies like ASP.NET,etc. as shown in the diagram below. The application server is the second layer which implements certain specific programs of business logic for processing. This layer acts as an interface between the users/clients and Database source this is the third tier which plays a key role in mapping between upper layer to lower layer as of Data Objects in Database Layer(DL). The third tier Database layer/tier follows it's own norms in securing, storing and managing data, which is known as Database Server. This third tier is also known as existing Enterprise Information System.

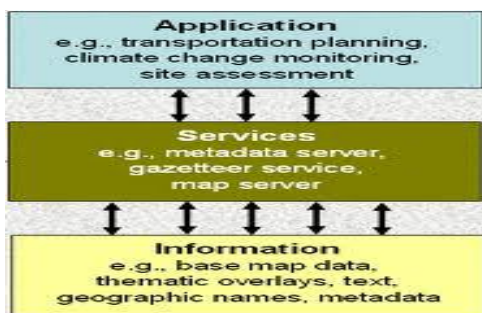


Figure-7.0 : Source : Enterprise Viewpoint [11]

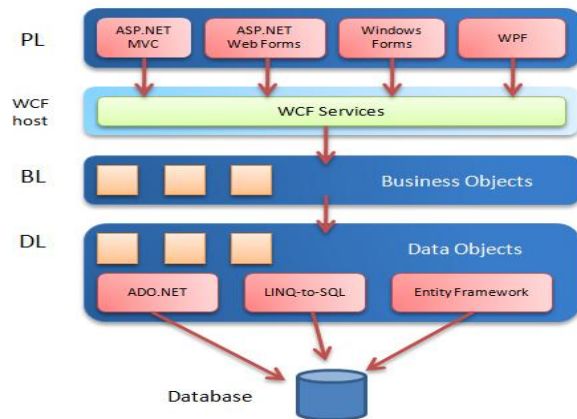


Figure-7.1:Source : Enterprise Viewpoint [11]

This description above and in Fig.7.0 & 7.1 is also same for three layer architecture for networking in which the middle tier as Application Server Layer where SOA, OMG in which DCOM, CORBA etc. types of technologies are used for web services in mapping from user requests to connectivity to where the required data are stored may be in different database servers for processing and generating the required output[11]. The domain people, products, operations, etc. for SOA shown below in the Fig.8.0 & 8.1.

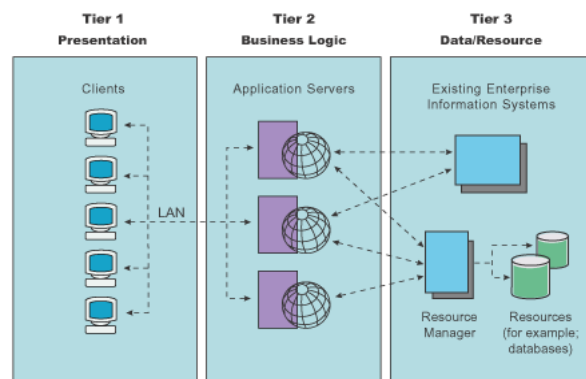


Figure-8.0: Source [11]

System Oriented Architecture



Source: <http://web2.wsj2.com>

Figure-8.1

Getting into further details of this three-tier architecture as elaborated into n-tier architecture shown in the Figures 9.0 & 9.1 below[12]. In this for example it could be taken as four layers, first one be of application layer- contains User Interface(UI) components which connects and processes through second layer , second layer is of Business layer which contains Business Workflow, Record Handling, exception handling and other utilities which links with Data Access Layer as third layer as the Data Access components and service gateways which executes on business logics and makes conversions according to the UI components with the Business workflow respectively to facilitates the Business Layer by connecting the final fourth layer

as Database layer through SQL and stored procedures to access the stored data from Database. All the processing between each layer is managed, secured and connected by Security, Operational Management and Communication Techniques.

N-Tier Architecture

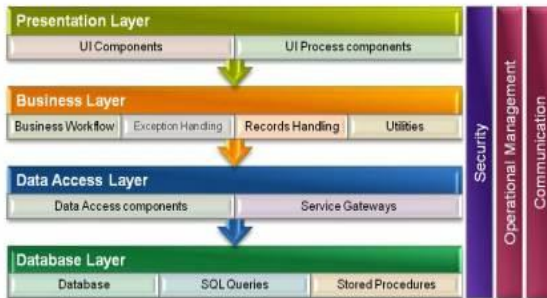


Figure-9.0: Source : Preparing Silverlight & SOA Presentation [12]

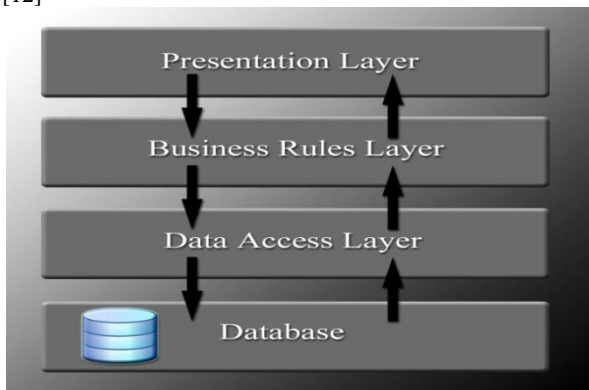


Figure-9.1:Source: Preparing Silverlight & SOA Presentation [12]

VII. Managerial Hierarchy in three stages matches the combination of Three-Tier Architecture of Technologies involved

The business organization is setup with the managerial hierarchy in three levels which is similar to the technology and DBMS/RDBMS architecture which were discussed above. This layout hold top level managers, middle level managers are in middle level and third level is of lower level management. Top level deals with the decision making process in strategic planning organizing for setting goals and giving out commands to the next middle level which is responsible for processing the goals set by top level with tactical planning and generates reports for the top level managers. This middle level processes the command given by the top level by taking up the data collected from lower level. Middle level manager is also responsible for training, motivating and coordinating the lower level managers. Lower level’s major functions emphasize directing and controlling the work of employees in order to achieve the team goals and act as data collector for processing for middle level.

Managerial Hierarchy in Business Organization

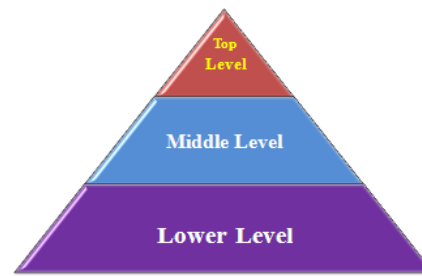


Figure-9.0



Figure-9.1: Source [13]

The above Fig.9.0 & 9.1 represents very basic three layer which represents the top level management as strategic planning(goal-setting) and decision making uses Expert Support System(ESS), Executive Information System(EIS) and Decision Support System(DSS).The middle level management as managerial control uses Management Information System(MIS) as tactical and the third level which is lower level or Operational Level management uses Transaction Processing System(TPS) & Enterprise Information Technology(EIT). Here once again we get to see the three layer architecture where command is given by the top level and passed onto lower level via middle level management for implementation and work flows from lower level as data collection as operational to top level as report being presented as respect to command flows. The main layer or key role is played by the middle level as it is responsible for effective tactical processing whether for command from top level or taking data from operational level as also explained via Fig.10.0 shown below:

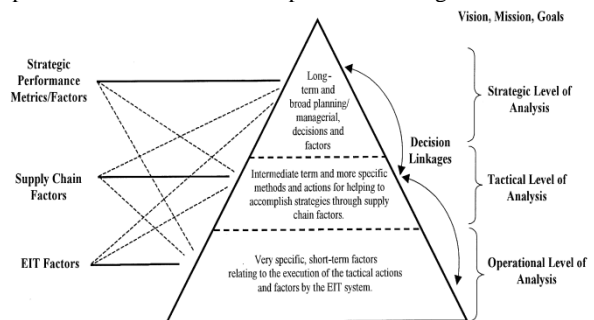


Figure-10.0: Source :Factor integration within an organizational hierarchical management structure [13]

Further, this three-tier architecture advanced to n-tier architecture in this framework of managerial hierarchy depends upon the size of the organization as in Fig.11.0 given below:

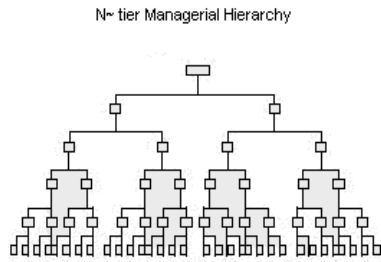


Figure-11.0: Source [13]

The common factor which we get to know is the three-tier architecture is the grey area is in the middle tier where critical processing takes place. The technologies, which is discussed above are the powerful tool helps with the innovative processes created which transforms the traditional business processes people implementing it within managerial hierarchy. Though, this is ongoing process of development in technologies for improvement of business processes within each business components at every layer of managerial hierarchy for the phenomenal growth of the business world in taking the competitive advantage in the global market.

VIII. Process Based Transformation Life Cycle for Business Transformation

To bring in transformation within process of business elements/components/units there are six stages(phases) which are similar to system development life cycle described below:

1. **Preparation:** Then planning of transformation takes place through thorough study of each business process planning, policies and practices by the organization. This study or investigations are done to have the clarity of each business elements according to the process involved within the organizational structure seeking for requirement and scope for transformation. This makes transformation effects more clear as the interlinking between the business elements more effective in achieving profitable objective as goal seeking.
2. **Practicability:** It is the possibility of cost and benefit analysis for transformation into new development. As, the transformation effect is for overall betterment against evaluation of cost derived for introducing improved or new processes. List of factors involved in this stage are (1) Costs, (2) Intrafirm adaptability, (4) Platform neutrality and interoperability, (5) Scalability, (6) Security, (7) Reliability, (8) Ease of use, (9) Customer support and (10) Perceived value[13]. Softwares like XML which manages database through web in communication technology like CORBA by OMG (Object Management Group) as a middle tier in three(n)-tier for mapping applications to connectivity to web enabled services and database servers within n~tier architecture.
3. **Examination:** Overall analysis and transformation between each subsystem, from one business process element effects the other elements which are interlinked. If any transformation takes place is scrutinized that is the “effect” for not only bringing in the same but an improved one. Overall mapping effect should enhance the practices more profitable made by the organization, work design practices could be developed for optimizing individual and group contributions to organizational performance during different phases of transition among business processes. This phase helps to follow the next phase of “Propose”.

4. **Propose:** Proposed models with symbols and notations for developing diagrams like flow charts, DFDs ,ER-Diagrams etc. for designing used in explaining about the clarity of the processes and mapping in between them which exists within business elements. New changes to be represented diagrammatically step by step otherwise overall change at a single shot might generate complexity instead stepwise becomes more convenient and understandable to the system in achieving objective one by one by each process attained within each business elements(units) respectively. This is represented through the model diagrams mentioned above.

5. **Performance:** After new proposed model is developed then it goes through various types of testing like white box, black box, alpha, beta, unit, etc.. These tests are performed before and while implementing the new transformation with the data and people as Human Capital Management trained who exist into practical possible practice for acceptance and adapt to change along the transformation. Certain practical conversion takes place like (1) *Parallel conversion*, (2) *Direct conversion*, (3) *Phased conversion*, (4) *Pilot conversion* [13] depends upon organization's suitability. The whole organizational structure is transformed taking into each business unit into consideration .i.e. unit installation at the end integrated performance is tested.

6. **Post-Implementation:** Routine feedback of practical implications and checking on errors which rectifies minor problems as maintenance. This phase polishes the transformation process within organization as it is finally practically developed and monitored in routine. If any major problem is identified then it might start with first stage of “Preparation” as decided by the top level management of the organization. Then life cycle comes into action as once again it has to go through all the above mentioned stages.

IX. Common Phenomena of three(n)-tier architecture technology, process and people in effect while Transformation

This three-tier or n-tier architecture is identified where information technology(IT) as tool which keeps the business running smooth and integrates all the business processes which exists throughout the business organization. Advancement in IT day by day emerging technologies are being adapted by the business world at every level in three-tier architecture.

The first layer(level), generally used by users which are either naïve or top level management from the managerial hierarchy are facilitated through front-end designing software in computers as rapid action development (RAD). For, this graphical user interface (GUI) with enormous, features to generate information required to be delivered with ease to the types of users. To provide users with enormous features onto their computer system continuous developments are taking place in IT companies. To keep on changing(transforming) the business processes as required by the top level(layer) users who are in the pressure of decision making and that is too for business transformation as strategic planning according to vision and mission in the three(n)-tier architecture.

The second layer level),also known as the middle layer where sensitive processing takes place, that is all the business logics are executed to become business processes. This layer is holds the responsibility as an interface either in managerial hierarchy or in information technology acts as a interface between top level to follow the command and processes it from fetching the required data from database and deliver the generated information to the top level(users) and storing it into database i. e. the third layer. Also known as application tier as in computer network and advancement of internet people sitting around the globe wish to access data of the company according to their rights get the facility for accessing database through this application servers' layer, represented in

OMG or SOA and technology used here as SAP, ERP, CORBA, OLAP, XML etc . Similarly, in managerial hierarchy middle level managers' role are crucial in getting relevant data/information processed from lower level managers and then generate critical reports for top level after processing at their level for strategic planning and decision making for setting objectives.

The third layer(level), this is the area for all kinds of processing related to data where they are stored, accessed and managed from it's own three(n)-tier architecture and norms, through which middle layer has to follow in accessing and processing. The lower level managers are responsible in relevant data collection for organization.

Figure-12.0 below represents the business process components/units and their interrelationship, technologies used for transformation by implementing business process based transformation development life cycle (BPBTDLC).

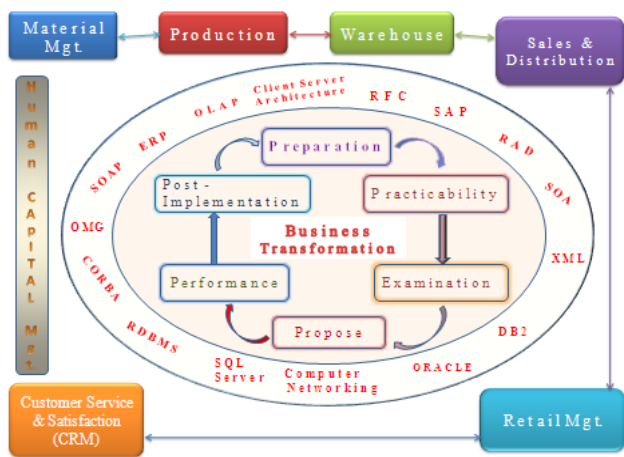


Figure-12.0 : Business Process Based Transformation Development Life Cycle(BPBTDLC)

Business drivers apart from general process, people and tools, such as customer satisfaction, changing market conditions, competitive threats, government regulations, and IT cost management, increase the need for improved IT responsiveness, speed, and flexibility. Other overarching business goals, such as creating a “business on demand” and shifting resources rapidly to growth opportunities, are also important elements that influences the organization's internal business logic strategies. For example, the following represent the strategic steps taken by IBM within its internal business transformation activities to satisfy these business drivers: 1. Business and process driven, 2. Promote information as a service, 3. Foster reuse, 4. Leverage and modernize legacy applications, 5. Incorporate third party products, 6. Enhance B2B (business-to-business) transactions[14]. In summary, major transformation efforts within the company are directed toward making it simpler for customers to do business with IBM and to increase its posture as a globally integrated enterprise. SOA, as both an integration platform and a way of approaching the creation of new IT solutions, plays a major role in IBM business transformation.

X. CONCLUSION

Change is the only constant, which exist in this world, change as “Transformation” term has become the necessity for the business world for their survival and growth in today's competitive business environment. To bring in certain business transformation each key drivers process (business logic), people (managerial hierarchy) and tools (technologies) of the business needs a thorough study as they

are strongly interlinked (integrated). In this article these three key business drivers are studied and brought out a common phenomena of three-tier or n-tier architecture between database management system (DBMS), system oriented architecture (SOA) and management hierarchy. Transformation is ongoing process at every layer of architecture and in each business units. So, from each business unit starting from material management to customer satisfaction i.e. from production of product to consumer's satisfaction by consuming that product all kinds of business processes occur within this path of business activities. The competition in market forces the business world for transformation in their business activities to enhance and take the competitive advantage over their competitors.

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Dr. Sharad Raghuvansh is currently working as Asst. Professor in Sharda University, Greater Noida, U.P., India. He has double Master Degrees, one in M.A. in Statistics, Banaras Hindu University, Varanasi, India and second in M.C.A. from Birla Institute of Technology, Mesra, Ranchi, India. He is awarded Ph.D. Degree from V.B.S. Purvanchal University, Jaunpur, India. He has published numerous research papers in various international and national journals. His interest areas are Web Technologies, Database Management System, System Analysis and Design and Management Information System. He has established himself in academics and administration as work experience for over fifteen years including professional experience in software industry as software engineer for two years. He is very keen in research areas of innovative e-technologies coupling with business logics for facilitating the business world.