An Efficient and Speedy Activity Model for Information System Based Organizations

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GJCST Classification : D.2.9

AN EFFICIENT AND SPEEDY ACTIVITY MODEL FOR INFORMATION SYSTEM BASED ORGANIZATIONS

Strictly as per the compliance and regulations of:

An Efficient and Speedy Activity Model for Information System Based Organizations

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Abstract - This paper presents an activity model that addresses the responsibilities among different C-level Officers in any IT-reliant systems in organizations. The activity model provides an integrated set of actions that extend and clarify the work system framework and related work system concepts, thereby helping in understanding, analyzing, and designing technical and sociotechnical systems. The activity model is an advance step toward an enhanced work system approach that is quickly accessible, understandable and clear visualization to business professionals, is more rigorous than most current applications of work system concepts, and can be linked more directly to precise, highly detailed analysis and design approaches for IT professionals. Specification of the activity model clarifies ambiguities in the work system framework and forms a clearer conceptual basis for tools and methods that could improve communication and collaboration between business and IT professionals through e-Media.

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I. Introduction

Unfinished and run-away projects, Workforce ignoring, Information overload, Employee mistrust, Security breaches all are the challenges of any IS based Work System due to poorly aligned with business executives. User requirements, the costs required to implement a new technology or update a technology dose not always realized by the C-level Executives because of communication and technology knowledge gap in organization. This paper addresses two aspects of the problem: 1) intangible and procedural gaps among different C-levels and 2) communication and knowledge gaps that blocks and degrade collaboration between business and IT professionals which also effects planning and Implementation in any business organization. E-Media which plays an important role in business organization can develop the relationship among C-level. The aim of this paper is to describe an activity model for describing, analyzing, and designing both corporate business system and IS together in a Work System. (Activity model are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency.[1] In the Unified Modeling Language, activity model can be used to describe the business and operational step-by-step workflows of components in a system. An activity shows the overall flow of control that is conditional or parallel. For example, the activity flow from customer to Chief Marketing Officer after an action Request for a new/updated technology is performed by the customer then CMO could perform another action (Verify requests) in any Work system.) The activity model is a significant reformulation and extension of the work system framework, which has a number of limitations that the model addresses.

The rest of this paper is prepared as follows segment **II** shortly illustrates the Background, Segment **III** described literature review, Segment **IV** described Model requirements, Segment **V** includes work system framework, Segment **VI** includes proposed work system environment, Segment **VII** establishes an activity model, Segment **VIII** describes the elements of an activity model, Segment **IX** includes implementation phase and lastly Segment **X** concludes the paper.

II. Background

This segment provides background about the work system approach in general and the work system framework in particular. A work system approach assumes that the unit of analysis is a work system, a business system in which human participants and/or machines perform work (processes and activities) using information, technology, and other resources to produce specific products and/or services for specific internal or external customers. Work systems change over time through iterations of planned change (projects) and through incremental adaptations and innovations that may be unplanned. New technology, government regulations, agri-terrorism, and biological threats are forcing work system to change the way they face these challenges. As a result, work system and going towards with information technology in the same alignment. So a

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better work flow model e.g., activity model, where collaboration is maintained between the business professionals and information executives to achieve goals within time frame.

III. Literature Review

Identifying a model is not a new topic in business organization or work system or academic research. However, activity flow on technology based work system has not been heavily researched in either the academic or public forums which leads to success rate on IS/IT projects remains unacceptably low. Much of the previous literature has focused on only their operations but poor business/IT communication, poor user participation in projects, lack of support by business executives, difficulties with implementation in organizations, technical and conceptual complexity of IS/IT projects, poor resources for projects, unrealistic project schedules, and staff turnover. IS/IT research has addressed these issues from various viewpoints, such as studying:

A. business/IT communication and business/IT alignment (e.g., Reynolds and Yetton (2009)).
B. the usefulness and pitfalls of IS development tools for IT professionals (e.g., zur Muhlen and Recker, 2008;)
C. concepts and models related to paths to success (e.g., Value Chain Analysis, Critical Success Factor models, Business System Planning (BSP), Strategic System Planning (SSP), the technology acceptance model)
D. reducing gap between sociotechnical and technical views of systems (e.g., metamodel, Steven Alter, 2010)

Finally, this paper's activity model fits into basic research concerning IS/IT concepts. If reducing communication and knowledge gaps were an important goal, the education of IT professionals might recognize more fully that most business professionals are more concerned with improving business performance rather than with specifying IT based tools (such as UML, Microsoft Visio) that they might use and get accurate design methodology.

IV. Model Requirements

Using the Laudon & Laudon definition of information systems the core requirements of an information system exists to collect, process, store and distribute information that supports the decision making and control of an organization. This provided the first requirement of our model. Our model must be able to identify the mechanics necessary to gather, process, store, and distribute information. Second the model must also identify if the information gathered is processed to support management of the organizations. Establishing these criteria as a means for identifying the existence information systems requires that our model

be two pronged. The first prong must be able to identify both the information processes and the reason for gathering information and the second prong must identify that the information decision making, coordination, and control in an organization. In addition to supporting being processed supports management before existence of an information system can be verified.

V. Work System Framework

Alter (2002) defines, a "work system is a system in which human participants and/or machines perform business processes using information, technologies, and other resources to produce products and/or services for internal or external customers". Alter's work system framework is developed from nine core elements as displayed in Fig.1. The first four elements: information, participants, processes, and technologies, constitute the systems doing the work. These first four elements define what Alter refers to as a basic system within his framework. The work systems output are the products and services received by its customers. The remaining three elements: environment, strategies, and infrastructure influence the overall process to determine "if a work system can operate as intended and can accomplish its goals" (Alter, 2002). Alter's framework provides a two-step approach to explore the activities established in an organization. The first step, the work system, identifies the components of the systems doing the work. The second step identifies the interaction of the work system with the environment, strategies, and infrastructure. This second step provides data on how systems are used which brings us to the second prong of our model development.
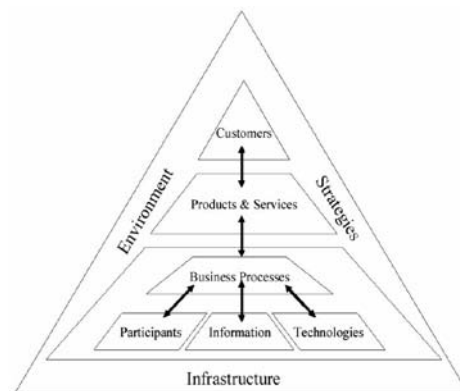

Fig.1 : Alter's Work System

Possible alternative frameworks. The work system framework was developed over time to guide its users to develop a basic understanding of an IT-reliant work system in an organization. However alternative frameworks are:

A. Business process. Consists of only one element instead of the nine elements of the work system framework. The work system approach has been called a business process approach, but it involves

much more than just the detailed logic of the business process.

B. Input-processing-output. Effective for computer operation but less useful for describing the operation of IT-reliant work systems in organizations

C. People, process, technology. 3-sided framework in three boxes is a reminder that people, process, and technology are relevant for thinking about systems in organizations.

D. SIPOC. A 5-element model used in Six Sigma analysis: supplier, input, processing, output, customer but does not clearly specified.

E. GRITIKA ontology. An ontology containing 7 concepts: goal, role, interaction, task, information, knowledge, and agent. Suggested by Zhang et al. (2004) for modeling e-service applications.

F. Zachman (2008) framework. A 6X6 framework outlining an enterprise's architecture, and therefore at a different level than a work system model. The 6 rows include scope, business model, system model, technology model, detailed representations, and functioning enterprise. The six columns include what, how, where, who, when, why.

G. Steven Alter's (2010) metamodel. an integrated set of concepts can be described using its 31 elements that bridge the chasm between sociotechnical and technical views of systems in organizations . But approach is mechanistic, does not focus on process of change, work flows, triggering conditions, resource requirements, business rules, and post-conditions of specific activities.

VI. PROPOSED SYSTEM ENVIRONMENT

Alter argues for an IS as a special type of work system. A work system is a system in which humans and/or machines perform work using resources to produce specific products and/or services for customers. An IS is a work system whose activities are devoted to processing (capturing, transmitting, storing, retrieving, manipulating and displaying) information [5]. The environment of any information based work system encompasses of input, processing and output. The work system environment is the "suprasystem" within which an organization operates and often determines how a system must function. As shown in Figure-2, the work system environment consisting of e-Governance (G2B), e-Media, e-Bank, Customers, Vendors, Other Competitive Work System, Economic Indicators, e-Learning will provide constraints and consequently, influence the actual performance of the work system can be described as follows:

A. e-Government (short for electronic government) here is a digital interactions between a government businesses/Commerce (G2B)

B. e_Media (short of Electronic media) are in the form of digital media known as video recordings, audio recordings, multimedia presentations, slide presentations, CD-ROM and online content.
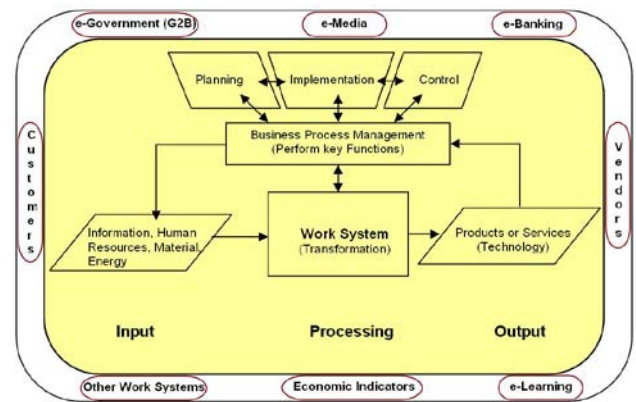
C. e-Banking Online banking (or Internet banking) allows customers to conduct financial transactions on a secure website operated by their retail or virtual bank, credit union or building society.

D. Other Work System is mentioned here a competitor who analysis provides both an offensive and defensive strategic context to identify opportunities and threats.

E. Economic Indicators (or business indicator) here is a statistic about the economy who allows analysis of economic performance and predictions of future performance of a work system.

F. e-Learning covers a wide set of applications and processes, such as Web-based learning, computer-based learning, virtual meeting, and digital collaboration. It includes the delivery of content via Internet, intranet/extranet (LAN/WAN), audio- and videotape, satellite broadcast, interactive TV, and CD-ROM.

Fig.2 : The work System Environment

Kay's (Kay & Edwards, 1999) functions of Work System can be expressed as a cycle where information is used to navigate and move through each of the functions: planning, implementation, and control. This cycle is also illustrated in Fig.2.

Planning is the first function also referred to as the strategic decision stage to identify problems or strategic direction occurs. The Business Process Management must identify the problem or opportunity and choose to act or not. The second function is implementation which is selecting and acting on a plan. Once a plan is identified and approved, resources and infrastructures are put into place with the technical side. Progress is verified on a routine basis to determine if the actions put into place are moving the Business Process Management towards the intended goals. Control or monitoring the progress of an action plan is the last function. If the progress is not acceptable, that is the invented technology does not follow the standard of a disqualified product then the overall process in work may be terminated by the Business Process Management.

VII. ESTABLISHING AN ACTIVITY MODEL FOR WORK SYSTEM

Fig.3. is an activity model for the analysis, design and implementation of new or updated technology in information system based organization. Actual work flow from worker to different C-level executives and related necessary actions done by the business process management is easily understandable from the figure. As earlier mentioned most of the work system consists of Kay's (Kay & Edwards, 1999) functions like planning, implementation and control. So we divide the work system into three phases according to Kay's function. Then activity flow among the phases is easily understandable by subdividing the phases.

In planning phase, Customer plays an important role as because most requests e.g., new or updated technology in an organization comes from customer. All sorts of requests are gathered and noted by the Chief Marketing Officer (CMO) who has investigated primarily on the market demand. Then the requests are sending to the corporate officers (CEO, COO) to take necessary actions to fulfill the customer demand. A meeting will be called to collaborate with all C-level officers to gather different ideas, methodologies, related necessary technologies, budget to build a plan. The plan may be discarded by the Corporate Offers if it will fail the budget or fall in time limit exceed. By the end of this phase the budget is passed for the request to implement otherwise.

In the implementation phase, the Corporate Officer will asked the Technical Officer (CTO, CIO) to implement IS/IT strategies. Emerging all resources e.g. IT-Participants, Non-IT-Participants, Software, Technological Entity, Hardware with all Infrastructure e.g., Human Infrastructure, IT Researcher/IT Specialists, Project Manger, Programmer, Technical and Information develop a new or updated technology to fulfill the user requests. In this stage a primary verification is done on the new born or updated technology. Circular verification is done by changing parameters like resources, infrastructure, methodologies, ideas, tools and techniques if is does not fulfill user requirements. In this phase IT-Participants can share their acceptance or demand with the existing technologies to the Technical Officers. Implementation phase will turn off if the technology verification is okay.
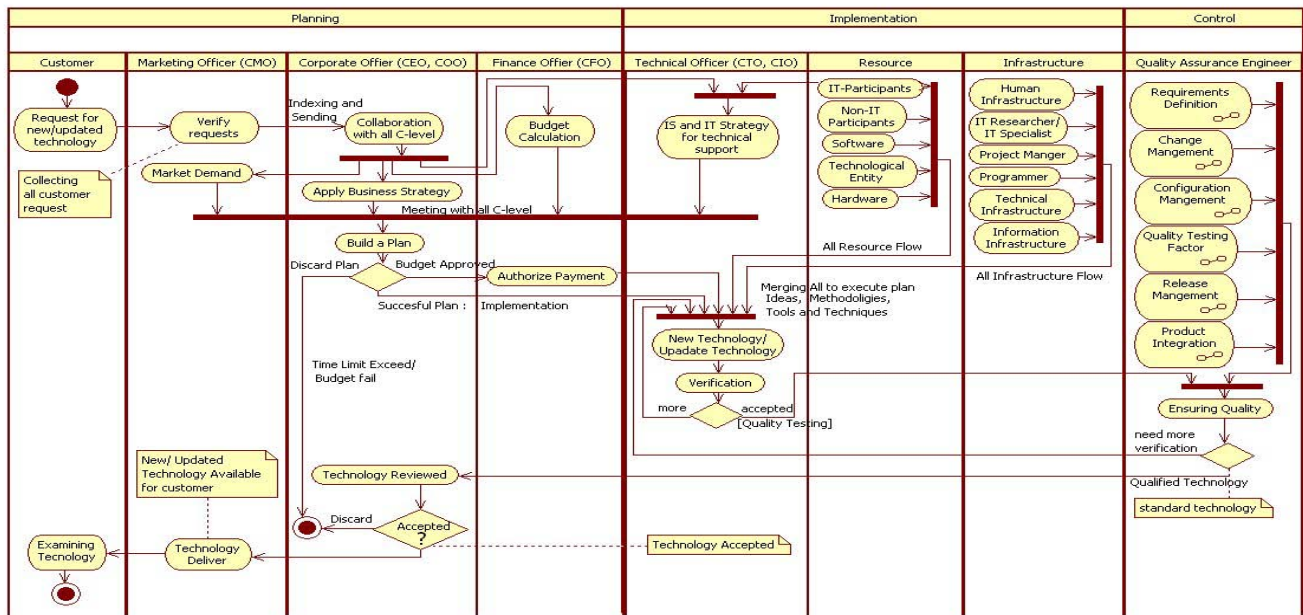

Fig.3 : Activity Model for IS based Work System

In the final phase of Kay's function control, a series of sub-activity like Requirements Definition, Change Management, Configuration Management, Quality Testing Factors, Release Management and Product Integration is performed together on the technology or products to test its quality with the standards. If it does not meet the quality parameters well, some sort of more verification is needed in this stage. A note for the qualified product is maintained for future learning in this phase. Then the product is returned to the business process management. Then again planning if fails the corporate level satisfaction or stop planning is corporate officers accept and order the CMO to deliver the new/updated technology or product. Thus a qualified product or technology goes to the customer for examining their requirements level.

VIII. Elements of the Activity Model

A. **Work systems functioning:** The proposed work systems can be functioned by three phases like planning, implementation and control to execute its goal.

B. **Infrastructure.** Includes relevant human, information, and technical resources that are used by the work system but are managed outside of it and are shared with other work systems.

C. **Customers.** Are requester of the work system' technology and recipients of products and services for purposes other than performing work activities within the work system.

D. **Marketing Officer.** To whom demand of new or updated technology request arises according to market demand.

E. **Corporate Officer.** Who makes decision and execute a plan, permit to implement and finally controlled or monitor the overall work system.

F. **Strategies.** Are relevant to a work system include enterprise strategy, organization strategy, and work system strategy. In general, they are the business policies to achieve the work system's goal. Here business strategies and IS/IT strategies differ from the point of technology related.

G. **Finance Officer.** Permit budget according to higher authority.

H. **Technical Officer.** A brief knowledge about all technical, operational and informational gather together to implement and verify permitted plan according to very fast upcoming technology.

I. **Resource.** Are needed to implement work system's plan including Participants, Software, Technological Entity and Hardware. Participants are people who perform working within the work system, including both IT-Participants and Non-IT Participants. IT-Participants can share their expectations from technology to the technical officers.

J. **Infrastructure.** Include Human, IT Researcher/IT Specialists, Project Manger, Programmer, Technical and Information. Here Human plays a minor role like clerical work in the work system and Information is what we used, created, captured, transmitted, stored, retrieved, manipulated, updated, displayed, and/or deleted by a specific activity in the activity model.

K. **Quality Assurance Engineer.** Measure the quality of a product by composing some sub-activity like Requirements Definition, Change Management, Configuration Management, Quality Testing Factors, Release Management and Product Integration. Always perform a comparison against standard.

L. **Products and services:** consist of information, physical things, and/or actions produced by a work system in a word here it is called Technology.

IX. Model Implementation

Through the use of the model illustrated in Figure-3 it was determined that each work system implemented the mechanics of their system in a unique fashion to achieve their individual business process management goals. The complexity of any work system can easily be optimized by importing and applying the activity model in any information system based organization. The activity model proved successful in determining the activity flow in the work system in passing some action state and three phases like planning, implementation and control. By completing a cycle of the activity model a new or refined technology or product will outcome.

X. Conclusion

The activity model of Unified Modeling Language is used in teaching and research, helping corporate executives to learn information technology, to maintain collaboration among C-levels, to give value of technological ideas and work, to distribute work flow among different levels, to monitor overall work. The activity model spells out the shortcomings of the all work system framework. The research is going on, so activity model is a standard for any work system that always integrates information system to their business process to reveal, enlarge and enriches the work system with technologies.

References References Referencias

1. Alter, S. The Work System Method: Connecting People, Processes, and IT for Business Results. Works System Press, CA.

2. Alter, S. (2002). The work system method for understanding information systems and information system research. Communications of the Association for Information Systems, 9, 90-104.

3. Alter, Steven, "BRIDGING THE CHASM BETWEEN SOCIOTECHNICAL AND TECHNICAL VIEWS OF SYSTEMS IN ORGANIZATIONS" (2010). ICIS 2010 Proceedings. Paper 54.

4. Böhm, Markus; Nominacher, Bastian; Fähling, Jens; Leimeister, Jan Marco; Yetton, Philip; and Krcmar, Helmut, "IT CHALLENGES IN M&A TRANSACTIONS – THE IT CARVE-OUT VIEW ON DIVESTMENTS" (2010). ICIS 2010 Proceedings. Paper 105.

5. Jean S. Adams, 2009. "Establishing a Model to Identify Information Systems in Nontraditional Organizations". Information Systems Education Journal, 7 (88).

6. Kay, R.D. and Edwards, W. M. (1999). Farm Management, 4th ed. McGraw-Hill, Boston.

7. Keen, P. G. W. (1978). Decision support systems: an organizational perspective. Reading, Mass., Addison-Wesley Pub. Co. ISBN 0-201-03667-3.

8. Kim, Heekyung H. and Brynjolfsson, Erik, "CEO Compensation and Information Technology" (2009). ICIS 2009 Proceedings. Paper 38.
9. Leavitt, H.J. 1965. "Applied organisational change in industry: structural, technological, and humanistic approaches," pp. 1144-1170 in March, J.G. (ed.) Handbook of organizations. Chicago: Rand McNally.
10. Zhang, H., Kishore, R. Ramesh, R. and Sharman, R. 2004. "The GRITIKA Ontology for Modeling e-Service Applications: Formal Specification and Illustration," Proceedings of the 37th Hawaii International Conference on System Sciences.
11. Zachman, J.A. 2008. "The Zachman FrameworkTM: The Official Concise Definition," Zachman International enterprise architecture, http://www. zachmaninternational.com/index.php/home-article/ 13#maincol.