

An Automated Workflow System Geared Towards Consumer Goods and Services Companies

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Abstract

The purpose of this document is to familiarize the reader about the usage of object oriented analysis, design and programming during the development of an automated workflow system for consumer goods and services companies; it provides an insight into the utilized methodology to incite discussions about the future state of workflow systems.

Keywords

Business, Erp, System modeling, Workflow

1. Introduction

The document's main goal is to show the building process of an automated workflow system towards consumer goods and services companies in which: the conceptual and researching background about Workflow technologies; the methodology used in the development and supporting research tool process and the results and projected goals after applying the proposed system are shown.

In the second section the most relevant theoretical backgrounds such as proposed system support are shown; in the third section the methodology used in the prototype construction is shown; in the fourth section the proposed system works is shown and in the fifth section a description about the system projection and implementation is done.

2. Background

A look to the automated workflow systems current situation leads us to do a concept and achieved development revision in the implementation framework of this kind of proposed system.

2.1. Conceptual background

The automated workflow system has been defined as the business process automation, in total or part, in function of how its documents, information or tasks are passed from a participant to another to get the task done according to a rules collection [3], equally, the workflow has stood up for being an activity collection that goes from the multiple coordinated execution tasks which are developed by different processing entities to get to a common goal [3], in which concepts such as business processes (organizational entities that exist in function of events remarks to achieve a specific goal) are integrated. This goal is directed by specific rules that allow the control and monitoring of all the conforming activities, these conforming activities are given some resources and specific roles which obey the corporative objective to which they are defined. This goal is achieved in a logical and sequential manner so that this allows verifying its subsequent control and monitoring. It is important to notice that in modern organizations the last idea represents one of the main concerns, every time a competitive environment as ours demands organizations to look for, first of all, integration and automation at all levels without losing the information flow, materials or company assets. The activities are defined as "work units doable in a manual, automatic or mix form, they get or produce stored information in several types of repositories," it means, they are the basic units from the processes that lead to the execution of tasks in the organizational procedure development, these activities can be in parallel or there can be an election among several activities to execute a procedure.

However, an aspect that requires a lot of dedication is the one related to the modeling of a business process. During such phase, patterns establish how, when, where and who executes the different process' inherent activities. The pattern or framework defines the process performance guaranteeing the clear objective, goals and resources establishment susceptible to verification through execution rules which report the process control and monitoring. This modeling diagram allows guaranteeing the information flow, moments and remark events from a specific requirement or information required to the final execution process. The events can be defined as consequence to a condition verification or fulfillment with regard to the process development.

Current works are focusing on the *business intelligent* area, specifically, characterized by the automat information generation from the previous acquired "knowledge" in the process execution. Furthermore, it is about establishing the number of activities and operations flow from a previous task programming securing improved efficiency and an important reduction in the error occurrences. In this sense, the main automation process task will be to define the process structure from its rules and related tasks, which will help to define the automation level required.

With the establishment of the Workflow Management Coalition (WFMC), in 1993, a development cycle was initiated for the process management systems inter operability with open architecture. WFMC published a reference and related standard model to guarantee a common language in the modeling, development and implementation of automated business process systems.

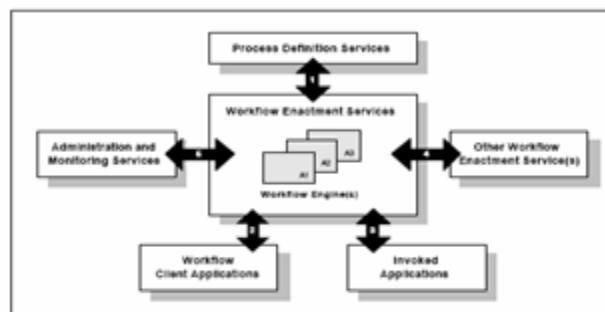


Figure 1: Metamodel Representation of the WFMC, 1993. Retrieved [2]

The WFMC takes into account the five interfaces in the reference model such as WAPI's (Interfaces programming with WFCM applications and formats exchange). The five WFCM working groups are conceived to work in one of the following interfaces: Tools to define processes, Clients workflow applications, Invoked applications, Other Workflow services, Monitoring and management tools.

Now, that the above conceptual framework was defined around Workflow systems. Let's move on to define the business processes' reengineering as the group of techniques, methods and tools which are based on the analysis and the design of modeled. Furthermore, they are documented and in execution processes, are inspected to predict possible changes or modifications in its value chain. As any designing problem, the process design entails checking and modification stages until the final standardization which will set for, the execution, control and follow up of all processes, all these are backed up by tools and computer platforms which have allowed the automatic change in the definition of business process in real time, enabling substantial improvements in modern organizations.

2.2. Research Background

Several researchers have identified Workflow as the computer model that empowers a normal method of nets construction, to support applications and processes which connect and interact among themselves.

In the same way, former researches have pointed out three important areas: Workflow architectures, specific languages and process analysis. These researching areas are of an important well known recognition to

sophisticated, advanced and high capacity Workflow construction systems.

Seth [4] and [5] established that Workflow and process modeling are currently the main problems within the field. This is found in innumerable works such as the ones from Carlsem who in 1997 (1), suggested the existence of a big product variety “catalogued” as workflow and how there have been many attempts to classify them in: Based on mail vs. based on data bases, data oriented vs. process oriented, Ad-hoc vs. Production and Time, design vs. execution time; as well as the use of a series of standards and efforts to unify methodologically and technically the Workflow systems in: initial tendencies (API and processes), current tendencies (objects) and organizations dedicated to the standardization process such as: WPMC (Workflow Management Coalition), WARIA (Workflow & Reengineering International Association), OMG (Object Management Group), getting close to the last tendencies such as: ontology development, XML-RDF and the introduction of formal methods.

Muehmlen in [2], concentrates on identifying the following working areas: Business Process Management Initiative Business and Process Modeling Language (BPML), Business Process Modeling Notation (BPMN), Business Process Query Language (BPQL), Electronic Business XML (ebXML), Business Process Schedule Specification (BPSS), Transaction Protocol (BTP), Web Services Conversation Language (WSCL), Web Services Choreography Interface (WSCI), Web Services Flow Language (WSFL), XLANG, DARPA Agent Markup Language – Services (DAML-S).

3. Methodology

To build an automated workflow system that succeeds in unifying the business process with the development process and computer systems application it is necessary to answer the following research question: Is there a modeling methodology that allows the unification of the process analysis with the Workflow system information analysis? To answer this, a work outline that allows offering guidelines for the construction of a *WPSUM* (Workflow Processes and Systems Unified Methodology) *has* been proposed, this outline is represented through the following stages:

Analysis and definition stage of added value processes: gathering the existing methodologies in terms of definition and process, macro processes, sub processes and more, it is considered to start from the organizational process information collection through the construction of a model that allows to give the Workflow responsible group all the documentation aligning to the following proposed outline:

TABLE 1: Data Collection format on Business Processes

MACRO PROCESS		
PROCESS		
ACTIVITIES	RESPONSIBLE	EXECUTION TIME

This format will descriptively collect (after having searched the existence information in the functions and preceding manuals from the organization) the relevant information about macro processes or key result areas from the organization that generates added value in the organizational management; the processes that are part of the macro process as well as the constituting activities with their responsible parties at the execution, management or control level; and the information about the execution time from each activity or the stipulated time.

Once, the data compilation related to the organization processes has been finished, a systematic process analysis is done, taking into account the use cases diagrams, activities diagrams and sequence diagrams, following the ULM – unified language model- is used to construct of the mentioned diagrams, paying attention to these conventions: Defined Macro- process as contexts and modules, Define processes as collaborations and packages, Define activities as use cases and Define responsibilities as roles and actors.

Once the elements constituting the diagrams have been defined, the conceptual graphic model, in which the

corresponding ULM diagrams are constructed, is applied and a fourth model called “Conceptual-graphic model” is added.

When the process models for the analysis are clearly built for the automated work flow system, a second stage takes place, the systematization and processes recording.

Process recording and systematization stage: with the collected information from the former stage diagrams the recording about processes is gathered, this will be automatically done from the graphics and models processing by the Workflow solicitor system, as it is done with tools type CASE.

Once the information regarding the process in execution has been processed through the transformation and information flow, a third stage is completed, “Database transaction”.

Database transaction stage: With the data supplied by the information recording in the processes execution time, two basic transactions in the database engine that supports the system occur, as it can be seen in the following graphic

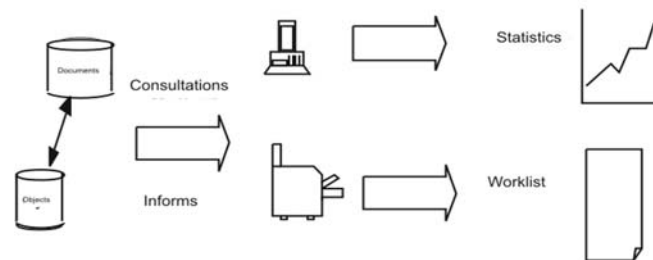


Figure 2: Processing and Transactions into System Database Engine

In the previous model two types of transactions were presented towards the database: the search type transaction, which occurs when information stored in the database regarding the processes execution state is required; and the inform type transaction which occurs when consolidated information about the processes execution is required. Nevertheless, for these transactions to happen within the system it had previously saved the process information, through recording information in the process execution, in document format or object form came to the process through the system entrance mechanisms. Once the information has been stored, this will generate a Worklist, or tasks in execution list which will allow maintaining a process control to the generation of the needed statistics in the organization decision making.

In this database processing a strong control and data analysis frame is supported in which through techniques from the multi varied statistics and data mining relevant information is consolidated to the process projection, likewise, an optimization algorithm is generated which allows execution activities time control inherent to the process for its optimization in the organization global management. Once the transaction diagram is in the solicitor system from the database, the “simulation” stage begins.

Simulation Stage: the simulator from the Workflow management system works as a multiprocessor multi-agent that establishes a bridge between the process modeling stage and database transactions stage, with the supplied information to the system about the processes in execution and the information control algorithm from the database solicitor system. A “decision setting” is created from the generated Worklist. The system rules are defined as: *What would happen if activity X gets delayed?* Such system rules generate possible awareness scenarios about the processes system execution.

Heretofore, in a summary form, a general diagram from the proposed workflow solicitor system presents the following setting:



Figure 3: System Schema

The above schema represents: a model that corresponds to stages 1 and 2 from the system, a transactioner corresponding to stage 3 from the system and a simulator that corresponds to stage 4 or system integration.

Once the macro schema from the proposed system is presented, it is preceded, using a ULM –Unified Language Model-, to present the model for the construction of the solicitor system automated workflow.

3.1. Analysis and design

Objects diagram

The objects in UML represent things, people, documents, machines or subsystems with characteristics and transact operations through their relations inside the information system.

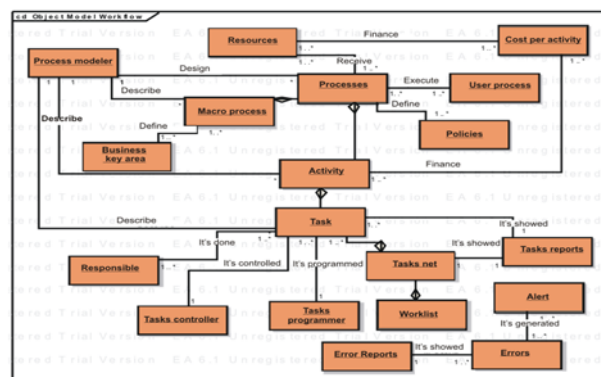


Figure 5: System Objects Diagram

3.3. Prototype construction

Once the analysis and design of the proposed system stage are accomplished, the implementation or codification process begins.

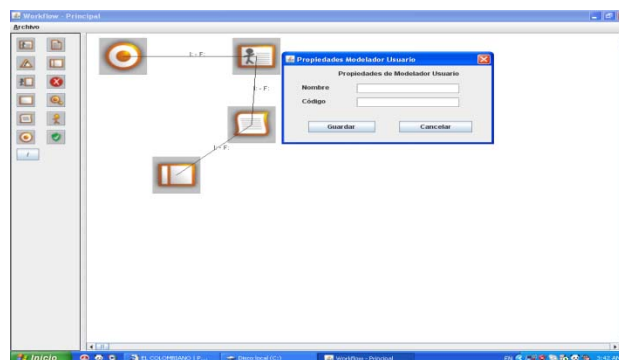


Figure 6: System Process Model.

Using Java programming language, and interface or Process Model module has been created, through icons. The icons are illustrated on the left side, furthermore, it is possible to develop a model or process diagram that is being analyzed. The information in each icon represents an element from the process whose information is saved in the recording forms that will be shown next to the diagram.

4. Conclusion

The developed project will allow other aspects.

- Contribute to developing software projects through the application of unified Modeling Language theory concepts UML in information systems.
- Allow the use of a methodological proposal as the one presented, in applied research, to develop information systems towards organizations that implement Workflow systems.
- Provide with an integral, flexible and safe management organizational system small and medium companies.
- Increase productivity in management indicators and information control in small and medium company.
- Reduce the organizational management times and delays in the task execution from planning and process control inside SMEs.

Therefore, this project which is in current construction, expects the improvement of the following indicators: Quality and productivity improvement in the organizational management from SMEs, Decrease the answering time in requests and operational requirements from SMEs, Increase information handling Standard from SMEs, Integrality in information handling and fast, agile and appropriate decision making. The designing tools as well as the programming ones have been adequate to the objectives planned in this project: low cost, flexible and adaptable. It has been possible to develop a first model for the system proposed. The achievements obtained with the making of this project are to date:

- The analysis and design of an information system to construct a solicitor workflow to small and medium companies.
- An unified methodology to the construction of the proposed system.
- A first prototype for the Process modeling.

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Biography

Javier D. Fernandez is a Ph.D candidate in Electronic Engineering at the University of Antioquia and Ph.D candidate in Software Systems Development at the University of Granada. He holds an Industrial Engineering degree From University of Antioquia and a M.Sc. from the same university. Her research interests include software engineering, simulation, and optimization.