Workflow Systems

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Workflow systems can be described according to the type of process they are designed to deal with. Thus we define three types of workflow systems:

Image-based Workflow Systems are designed to automate the flow of paper through an organization, by transfering the paper to digital “images”. These were the first workflow systems that gained wide acceptance. These systems are closely associated with “imaging” technology, and empathize the routing and processing of digitized images.

Workflow was initially closely associated with imaging, where workflow software helped to automate image routing. In a typical scenario, incoming mail (consisting of forms to be processed) is digitized and stored on optical discs. The workflow software manages queues of pending documents, automatically balancing the workloads of individual workers that are processing the incoming forms.

A case study of automating correspondence response to US X Telecom’s customers.

X Telecom receives correspondence from 80,000 to 100,000 of its phone customers each month. Prior to implementing a workflow system, it took 20-30 days to respond to a letter. After the implementation of the system, the response time was cut to 5 days, with a 50% reduction in staff and productivity improvements of 70%. X Telecom not only digitized and routed the incoming correspondence, but accessed networked databases and presented relevant information in CRM with the image. In some cases the workflow system can place the appropriate

information in a form letter with no operator intervention.

Form-based Workflow Systems are designed to intelligently route forms thoughout an organization. These forms, unlike images, are text-based and consist of editable fields. Forms are automatically routed according to the information entered on the form. In addition, these form-based systems can notify or remind people when action is due. This can provide a higher level of capability than image-based workflow systems.

Formed-based workflow takes image-baed workflow one step further. Rather than simply routing images to workers, forms are routed. Since forms contain data that is accessible to the workflow system, conditional decisions can be made automatically by the workflow system. Thus routine forms might have much of their data automatically filled in, while exceptions could have complex rules for their processes.

An example of how this form processing is done, and a comparison to imaging systems is the following:

(Diogo Teixeira and Jeff Thompson’s, 1993)

Banks are a natural application area for image-based workflow systems, since they still process enormous amounts of paper. This article gives an overview of how banks are starting to use workflow software for the routing and control of documents in the form of images. Workflow systems are described that are concerned with the very high volume of clerical type work in banks that is not routine enough to be processed automatically, but falls into clearly definable categories so that there are a controllable number of cases, outputs and options. It is clear that banks are starting to see the advantage of transitioning to form-based workflow as well.

The authors point out that it is almost impossible to make use of imaged documents without implementing workflow software at the same time. Workflow software is viewed as primarily a

means for tracking and controlling documents.

The discussion on workflow benefits from numerous references to how workflow is being applied in collection systems, mail tracking systems and credit card processing, among others.

Five benefits are given for adopting workflow software:

1). There is faster processing of work, since the total transaction time is generally much greater than the time to complete the work steps

2) Workflow systems are usually based on the client-server architecture, as opposed to mainframes

3) The information processes of the bank (the “work flows”) are made explicit and are more easily changed

4) Paper is eliminated

5) Financial losses from misprocessed paper are eliminated

Coordination-based Workflow Systems are designed to facilitate the completion of work by providing a framework for coordination of action. The framework is aimed to address the domain of human concerns (business processes), rather than the optimization of information or material processes. Such systems have the potential to improve organizational productivity by addressing the issues necessary for customer satisfaction, rather than automating proceedures that are not closely related to customer satisfaction.

Coordination-based workflow is grounded in the theory of communication and coordination developed by Fernando Flores and Terry Winograd beginning in the late 1970s (Flores 1979, Winograd and Flores 1987). Having proved successful in a

series of case studies, this theory is starting to emerge as the basis of the new understanding of work.

Most human coordination occurs in the requesting, making, and fulfillment of commitments between people, and he proposed that the importance of the computer lies in facilitating this kind of coordination rather than simply in data processing. The basic cycle of coordination reappears at many levels of an organization, not just between individuals, and that the organization itself could be seen as a network of recurring workflow loops. In an accumulating series of case studies, it has become clear that the workflow-loop map is the basis for measurable and significant improvements in productivity and in satisfaction of customers and employees Although the workflow notation was invented for a commercial business context, it is much more general. It can be used to map coordinative processes among humans in any domain.

The adjacent figure shows the generic structure of a coordination loop, called workflow. The notation supports an interpretation that work is a closed loop process in which a performer completes actions leading to the satisfaction of a customer’s or client’s request. During any phase, the participants may make requests of others, thus initiating secondary loops whose completion enables forward progress in the primary loop. This generates a network of connected loops: loop segments can be further refined, fractal-like, into more loops. A human coordinative process is a network of recurrent loops designed to carry out a specific function. An organization can be seen as a network of such processes that collectively carry out the organization’s mission.

The above figure shows, the map for a procurement process of an organization, illustrates expansion into secondary workflows; in this case, the primary performance phase is expanded into three sequential secondary loops. The figure also illustrates a new notation that shows how client-server computing structure interacts with the business process and

affects its performance. In a case study at George Mason University, we found that the process of student advising cannot be made to have a fast turnaround unless the transcripts of individual students are available on a moment's notice to a faculty advisor during an advising session; to achieve the required response time, the database must be mounted on a local server (Denning and Medina-Mora 1994).

The power of this notation derives from two complementary aspects. First it explicitly shows the actions leading to the satisfaction of an agreement between two parties. Second, it shows direct connections between incompletions of loops and breakdowns such as persistently dissatisfied customers, wasted effort in complaint loops, lack of trust, or poor market credibility. Figure 3 shows how a persistent incompletion in the primary loop of a procurement process can give rise to a new secondary loop for complaint resolution, which can further delay customer satisfaction and unnecessary load to supporting computing servers. Case studies show that organizations that persistently complete their loops on time will have many fewer of these problems. Business process re-engineering can be significantly facilitated with workflow-map notation that shows both the business process and client-server computing systems (Denning and Medina-Mora, 1994).

The workflow map is explicitly concerned with the making and fulfilling of commitments, with determining who is responsible to carry out the work and by when, and with the satisfaction of the person making a request. These concerns place the organizational processes at a higher level of abstraction than the business, material and information processes of an organization – the latter being the processes that move physical items and information items to various places where they are manipulated and combined. The more general organizational processes drive materiel and information processes. For this reason, tools for observing, measuring, and modeling material and information processes – e.g., IDEF1

and Queueing Network Models – are not powerful enough for building workflow systems oriented towards all organizational processes.

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