# Implications for Networked Multimedia in Administrative Work-Flow

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***Summary**: This paper gives an overview of contemporary concepts for increasing the efficiency of working environment, generally enveloped under the term 'workflow'. Special attention is paid to administrative environments, ranging from corporate to government administration. Multimedia applications, such as telepresence and videoconferencing, telecooperation, computer telephony, etc., are implying some new demands on networking infrastructure. These implications are the main issue in this paper.*

## 1. INTRODUCTION

Like many high-tech buzzwords, *workflow* is frequently mentioned and seldom understood. Simply defined, it is the process by which individual tasks come together to complete a transactions, a clearly defined business process, within an enterprise. Such transactions may occur repetitively in the normal course of business and follow standard set of procedures - processing an order, for example. Or they may be purely ad hoc, occurring rarely and in changing forms. In either case, they involve the coordination of multiple applications and users. As a result, they need to be tracked and automated.

## 2. Workflow

Although workflow software is available today, it is relatively unknown and not well understood. Workflow has been deemed to be more than worker collaboration and facilitated document interchange. It has been touted as the ability to autonomously complete the next step in a list of things to do.

According to survey lead by BIS Strategic Decision, Inc. [1], in Europe and Great Britain during 1993, 20% of survey respondents have installed a kind of workflow software, 54% are considering to install workflow, and only 26% are not yet thinking about it.

BIS Strategic Decision, Inc. also surveyed the software platform that respondents thought preferable for workflow installation. The results of that survey are shown in Figure 1. It is clearly visible that the wast installed base of LAN attached personal computers is very fertile ground for workflow software implementations.

## 3. Workflow and networking

What does workflow technology have to do with networking, other than the obvious fact that workflow technologies do not implement well outside the realm of interconnected users?

There are several considerations for the network supervisor. First, traditional work (sneakernet) does not allow for automated statistics gathering, work process modeling, or simulation. Second, workflow increases network traffic considerably; it puts much of the interoffice communications on the wire and at the server.

Third, workflow implementations can be complex. As complex as workflow may look on the surface, the solutions presented by workflow-enabling products must be simple and even elegantly enabled if workflow technologies are to succeed in the market.

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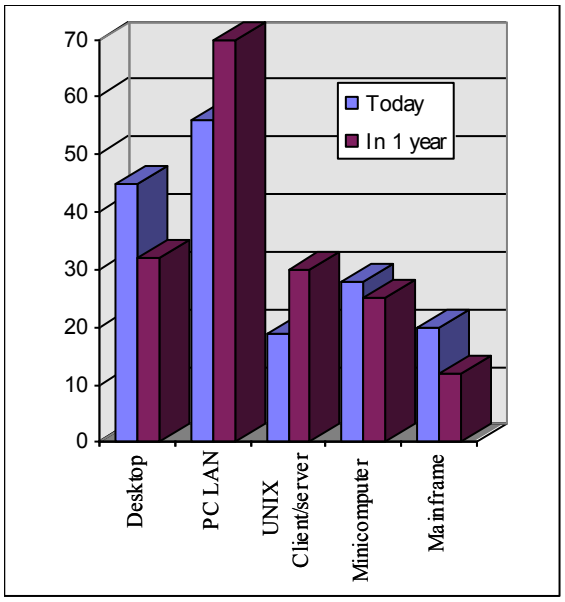


**Figure 1.:** Preferred workflow software platform (Source: BIS Strategic Decision)

Workflow technology, as offered in the marketplace today, is based on several architecturally separate paradigms:

* Forms-centered workflow
* Communication-centered workflow
* Procedure-centered workflow

These paradigms show just the foundations on which the architecture is built. No matter how called, all of the three varieties of workflow depend on networking. It could be stated that networking is the enabling technology for workflow systems.

### 4. Workflow and multimedia

One of the components in this enabling technology is known as *groupware*, which is software intended to create a shared workspace that supports dynamic collaboration in a work group over space and time constraints. Although everyone will agree that groupware is not workflow, it is obviously important part of it.

Now, what is the shared workplace? Even in heavily computerized individual workplace, users often work both with computers and on the physical desktop, and frequently move back and forth. Printed material, such as books and magazines, are still an indispensable source of information. When designing real-time shared workspaces co-workers should be able to chose either computers or desktops and to switch freely between them. This choice should not depend on the other members' choices. Group members should be able to use a variety of heterogeneous tools, computer based and manual, in the shared workspace simultaneously [2].

Current groupware does not effectively support this concept of openness in shared workspaces. There is need for a meta-technology for fusing a variety of traditionally incompatible media such as paper and computer files. This meta-technology is found in *multimedia*.

The term multimedia refers not to a single technology but rather to the number of various technologies for gathering, transferring, storing and retrieving documents in multitude of formats including live video, audio, graphics, image and textual data.

### 5. Seams in workspace

The new, shared workspace is required to be open, in the sense that no new piece of technology should block the potential use of existing tools and methods. A new piece of technology often creates the *seams* or discontinuities in an old workspace. The world is full of seams. Application programs currently in use, running on the same or different platforms, create many seams of incompatible data formats and inconsistent user interfaces. Every seam adds to the users' cognitive load.

Looking at the administrative working environment, various seams could be recognized (Figure 2). First there is a seam (1) between working with and without computer support. As mentioned, this creates two separate individual workspaces, one for working with computer based data, and another dealing with documents on more classical media.

The second seam (2) separates two work modes, individual and cooperative. Distinctive feature between working modes is use of communication for cooperative work. Communication itself has two modes, asynchronous and isochronous, creating another seam (3).

Asynchronous communication covers most of communication media used in today's administrative office, from postal mail to e-mail. Participants in this mode of communication are not tightly bound to either time or space for the session.

Isochronous communication enforces temporal and spatial constraints for the participants of the session. If the session is conducted face-to face, communicating persons are bound to be in the same place at the same time. By using teleconferencing and telecommunication support session can be relieved of spatial constraints, but the time constraint still exists. This also creates a seam (4) between localized and distributed meetings.

As enabling technology for administrative workflow, multimedia is expected to smooth and eventually remove the seams from the workspace.

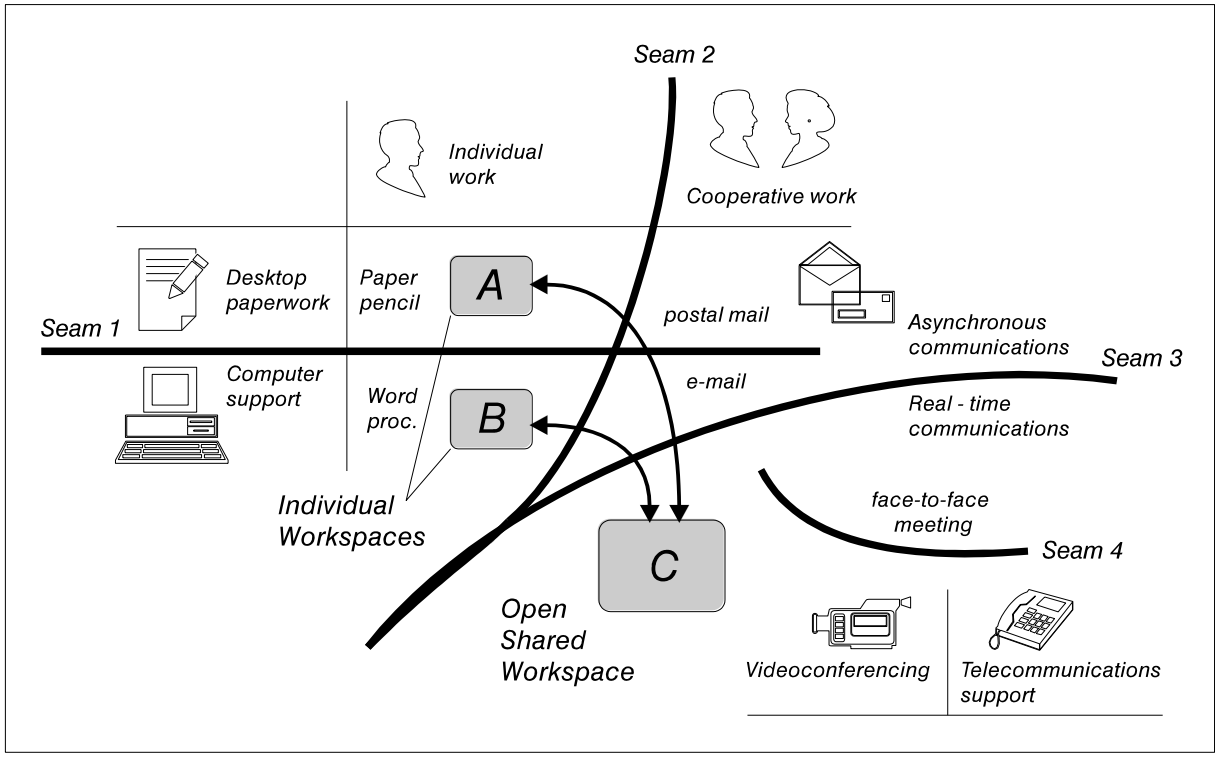


**Figure 2.:** Seams in administrative workspace

An example of smoothing the seam on the work-space is seen in computer telephony, application of computer control to one of the most classical office tools - telephone. This could be a real distributed multimedia application including call control, voice processing and speech synthesis [3].

## 6. Multimedia networking

Distributed multimedia applications require digital networks for the transfer of audio, video and other media data. Mostly, current networks are not appropriate for these applications. Limited bandwidth and protocols with unconstrained latency are ill-suited for multimedia traffic. Multimedia networks should provide a better match for workload characteristics of distributed multimedia applications [4]. Multimedia networks will differ from current local and wide area networks by the following features:

***Bandwidth***. One stream of digital video, even compressed, can generate load of several Mbit/s. Only few of such streams could saturate a local area network such as Ethernet. Multimedia networks will probably need bandwidths of Gbits/s. This is especially critical in long-haul segments where it is expectable to have many video streams at the same time. Broadband ISDN and Asynchronous Transfer Mode are examples of relevant technologies for future multimedia networks [5].

***Multicasting***. Distributed multimedia applications often require transmission from one source to many many destinations. The protocols for multimedia networks should include this feature as well as allow that the set of destinations change over time.

***Temporal constraints***. The multimedia data transmission is subject to timing constraints. Candidates for these constraints are data delivery latency and jitter. This is essential for applications vith live data, also called real-time applications.

***Reliability***. Reliability is a question of quality. In comparison to text or numeric data, continuous media data (audio, video) are less sensitive to errors and loss in transmission. Losing a few pixels of one video frame, or few bits of an audio sample, will be almost unnoticeable. However, as error rate increase, noise is introduced which will eventually lead to unacceptable presentation quality. Also, multimedia networks will carry sensitive data files so the reliability should not be neglected.

***Quality-of-Service (QoS)***. Different applications have different requirements regarding the com-munication quality. In a conferencing system, where data are presented only once, a higher error rate will be tolerated than in an application that records multimedia data for future repetitive presentations. Network can support these requirement variations by allowing the application to specify *Quality of Service* parameters. The multimedia network will then allocate sufficient resources to satisfy the

application's demands, or tell the application that the network is busy.

### 7. Conclusions

In corporate networks, application environments are mixed at many levels. It is not reasonable to believe that production users will migrate away from acceptable functionality or forego acquiring greater functionality with the implementation of workflow. Workflow must integrate with various application platforms (even heterogeneous ones) if it is to be accepted.

### LITERATURE:


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