Technology: continued rapid change

Reader Notes

- Standard interfaces emerge.

- Work management system will consist of interlocking but independently conceived and architected components. Rapid move to object orientation.

- Production and workgroup/ad hoc models converge.

- Fast move to work management and E-form intelligent templates.

Market: growth and polarization

- The technical maturity and common sense economics will cause the work management market to explode by 1998.

- Workflow specialists emerge from market consolidation, but in the next 12-18 months different work management models and products will continue to create confusion.

- Services providers continue to be key.

User Strategies: IS and end-user challenge

- Readiness state of organizations for client/server computing and changing end-users work habits will remain major issues.

- Successful execution will demand proactive management and planning. A fundamental reshaping of IS role is needed.

The synthesis of work management and electronic forms with business applications will provide dramatic business improvements during the balance of the 1990s.

1. What user and market forces will drive the adoption of workflow /E-form technologies for work management?

2. How will the simplicity of the electronic form enable it to become the conduit for complex business processes?

3. Which vendors and products will be strategic to work management?

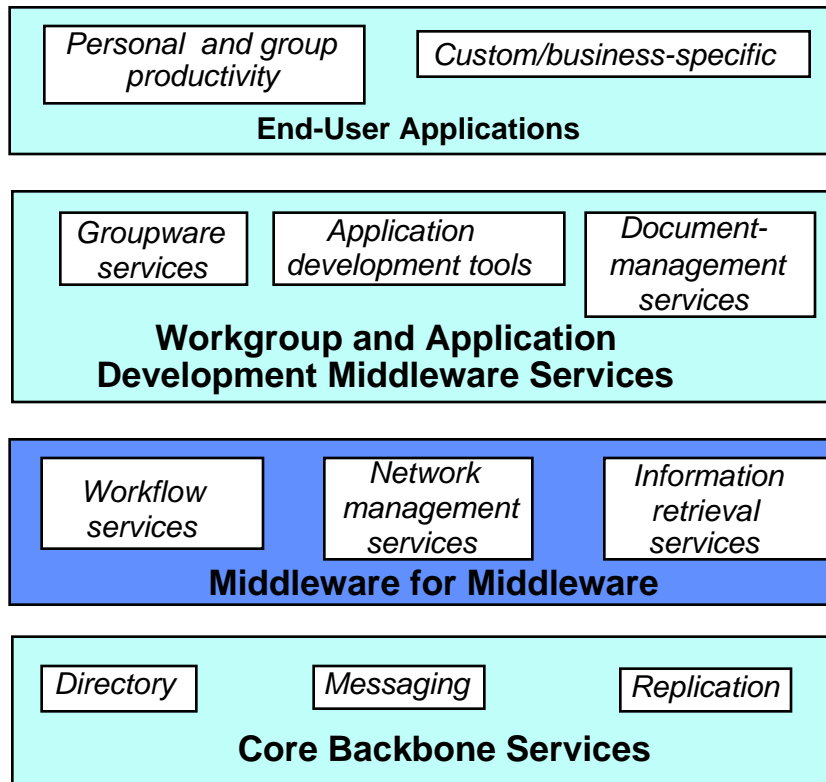**4. How must IS organizations change to plan, implement and support work management systems?**

Work management and E-forms are two of several core topics of research integrated primarily in Gartner Group's IDOM and OIS services. In the IDOM service, the research focus is on production configurations, whereas in the OIS service the focus is on "ad hoc" configurations. While there are many similarities between these configuration styles, each exhibits distinctive differences in scope, robustness, user and vendor strategies.

What user and market forces will drive the adoption of workflow/E-form technologies for work management?

Workflow is Middleware for Middleware

Personal and group productivity	Custom/business-specific

End-User Applications

Groupware services	Application development tools	Document-management services

Workgroup and Application Development Middleware Services

Workflow services	Network management services	Information retrieval services

Middleware for Middleware

Directory	Messaging	Replication

Core Backbone Services
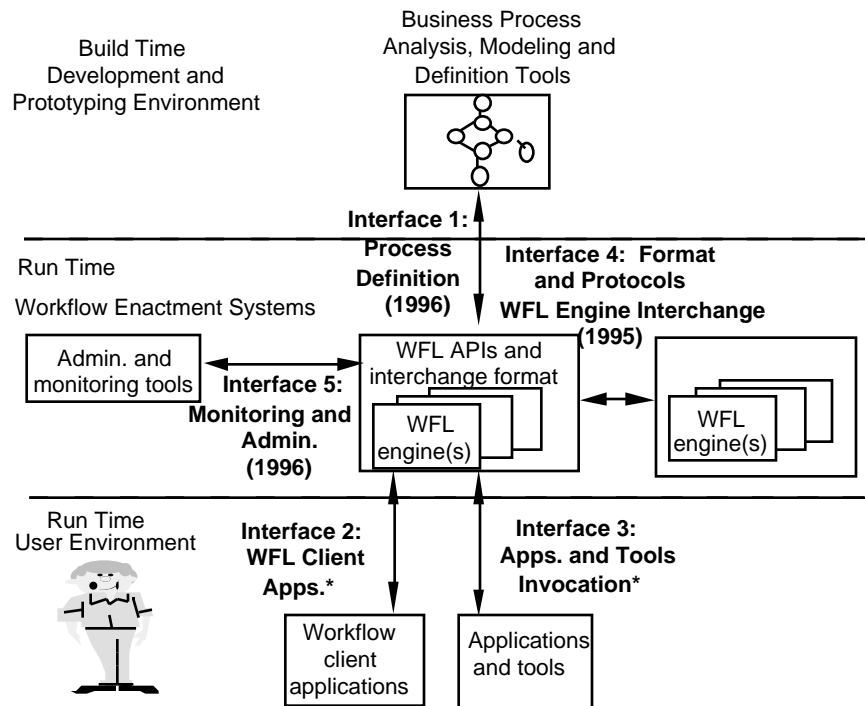
Source: Gartner Group

We have analyzed the workflow market for the past five years. Workflow began as an integral component of image management (e.g., ViewStar's ViewStar, IBM's WAF), client/server (e.g., R/2 and R/3 from SAP, SmartStream from Dun & Bradstreet Software), packaged applications and application-specific products (e.g., Odesta's ODMS). Over the last three years, products (e.g., FileNet's VisualWorkFlo, Reach's WorkMAN, IBM's FlowMark, Early Cloud's MDp) have emerged with a new design center — workflow technology as a workgroup or enterprise middleware architectural layer for use by many applications. At the same time, other middleware-level services such as document management and groupware have emerged that depend on workflow technology as a vital component. Logically, then, workflow serves as a low-level middleware layer (as "middleware for middleware") with an expanded role of supporting a series of higher-level services (e.g., document management), application development tools (e.g., PowerBuilder or Visual Basic) as well as end-user/workgroup applications (e.g., Lotus Notes and personal productivity tools). Due to this evolution, workflow vendors are beginning to offer tools for enterprisewide workflow automation.

By 1996　standard middleware services will provide the starting points to break down barriers limiting workflow component integration and interoperability (0.7 probability).

WfMC Reference Model

Build Time
Development and
Prototyping Environment

Business Process
Analysis, Modeling and
Definition Tools

Interface 1:

Process Definition (1996)

Interface 4: Format and Protocols

Run Time

Workflow Enactment Systems

WFL Engine Interchange (1995)

Admin. and monitoring tools

WFL APIs and interchange format

Interface 5: Monitoring and Admin. (1996)

WFL engine(s)

WFL engine(s)

Run Time
User Environment

Interface 2: WFL Client Apps.*

Interface 3: Apps. and Tools Invocation*

Workflow client applications

Applications and tools
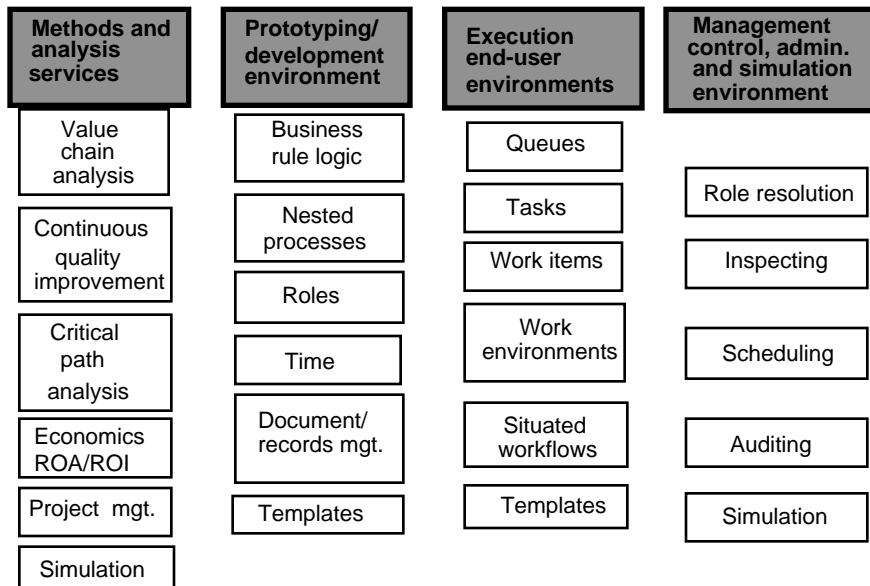
* Working Draft Available

Source: Workflow Management Coalition and Gartner Group

Key Issue: What user and market forces will drive the adoption of workflow/E-form technologies for work management?

The WfMC addresses workflow software interoperability in five key areas. WfMC standards will enable the different vendors' software modules to plug-and-play at various levels. It is likely that Interfaces 2 and 3 will be consistent with the ODMA workflow extensions. Interface 1 will provide users with a choice of BPR/modeling tools that ultimately will provide process definition interpreted by workflow engines as a workflow model. This will benefit users by allowing the process modeling or analysis to be encoded directly into the workflow software engine. Common format and protocols will allow interoperability between different workflows, and Interface 5 will permit a common administration (e.g., a FileNet workflow from an IBM monitoring module). In addition, users should watch Microsoft and Wang's work to define another de facto standard workflow API extension to MAPI (WMAPI). We believe WMAPI will be a leading contender to solve the WfMC's effort to define a run-time workflow API.

By 1997, interfaces will exist across the various IT architectures and middleware services and an era of *enterprise workflow* will begin (0.7 probability).

Methods and analysis services	**Prototyping/ development environment**	**Execution end-user environments**	**Management control, admin. and simulation environment**
Value chain analysis	Business rule logic	Queues	Role resolution
Continuous quality improvement	Nested processes	Tasks	Inspecting
Critical path analysis	Roles	Work items	
Economics ROA/ROI	Time	Work environments	Scheduling
Project mgt.	Document/ records mgt.	Situated workflows	Auditing
Simulation	Templates	Templates	Simulation

Key Indicators:
Robust system mgt.
Modeling Tools: front-end to workflow
Messaging, DM, APIs
Workflow format and protocols: interoperability
InfoBase: data and document model
Ad Hoc/situated and production processes support
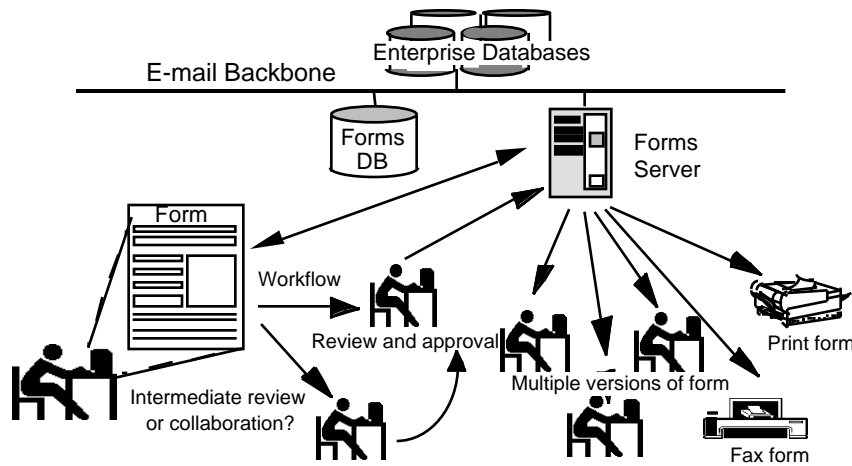
Source: Gartner Group

Key Issue: What user and market forces will drive the adoption of workflow/E-form technologies for work management?

Workflow is bound too closely to specific applications to consider enterprise workflow a reality. We believe that enterprise workflow means more than scalability and availability across heterogeneous platforms. Enterprise workflow also means having a real *comprehensive vision* of the workflow management marketplace in terms of the development tools, standardization efforts and awareness of factors such as groupware systems, business intelligence systems and production-class applications that must be presented and managed in a consistent way. We don't expect a single vendor to deliver completely on this vision. We believe enterprise workflow vendors, together with their quality components, should be the ones to help customers select quality partners that can provide other IT components. For software suppliers, this includes having system integrators, VARs and services providers carrying the same message in customer environments.

**By 2000, the majority of large organizations will implement
E-form products in combination with E-mail   and workflow,
growing the E-forms installed base to over 30 million seats
(0.7 probability).**

Reader Notes

Enterprise Databases

E-mail Backbone

Forms DB

Forms Server

Form

Workflow

Review and approval

Print form

Intermediate review or collaboration?

Multiple versions of form

Fax form

Create	*Client*	*Server functions*
Design/create	Multiplatform	Access multiple databases
Forms update	Multi-OS	Workflow
Forms mgt.	Multi-GUI	E-mail routing/mgt.
Workflow		Process tracking
		Print to various PDLs
		Directory services
		Forms mgt.
		Document mgt.

Source: Gartner Group

**Key Issue: What user and market forces will drive the adoption of workflow/E-form
technologies for work management?**

We estimate that about $6 billion is spent on paper forms in North America and 20 times that
amount is spent processing these forms. This obvious attraction has spurred the maturing and
expansion of E-form products beyond their initial role of data capture, report display and
paper replacement, to a tool for automating administrative processes. The integration with
databases and messaging capabilities included in leading E-form products for some time has
been complemented by the introduction of basic workflow facilities. This relatively simple to
deploy routing and tracking capability offers users an inexpensive way to streamline forms-
based processes such as expense report approval and travel authorization. It also has put
pressure on traditional production-class workflow vendors with entry point workflow
solutions.

Through 1999*,* the pressure for increased flexibility and greater innovation, combined with changes in the work force, will accelerate the adoption of IT targeted at building cooperation and coordination systems (0.8 probability).

Organizations are a Portfolio of Dynamic Processes

Innovation · Entrepreneurship

Competence-building
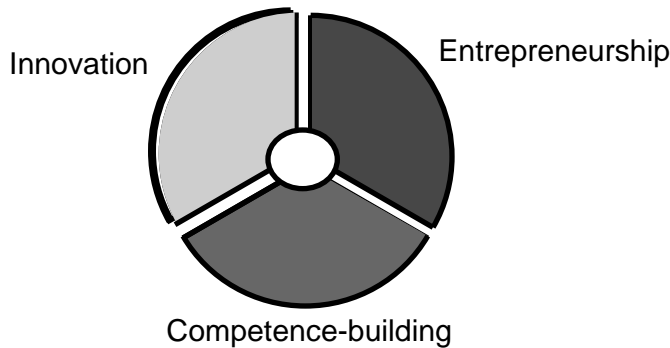
Three Core Processes

Entrepreneurship: produces creativity and innovation in value-added work force

Innovation: promotes continuous renewal of strategies and ideas

Competence-building: builds skills across internal organizational boundaries

Work In Progress Equals Business In Progress

Source: *Harvard Business Review* adapted by Gartner Group

Key Issue: What user and market forces will drive the adoption of workflow/E-form technologies for work management?

The target of an effective business transformation strategy should be to provide the foundation for conducting business electronically. In the second half of the 1990s, companies will be challenged to control unit costs while at the same time multiplying innovations, accelerating product cycles, improving customer service, reducing waste and saving energy. For example, by 1997, 3M plans to generate 10 percent of its annual revenues from products less than one year old, a major challenge in terms of flexibility and innovation capabilities. Last year, 30 percent of 3M's 1994 revenues came from products less than four years old. In this respect, workflow management and groupware software — the foundation for supporting groups of users' collaboration and cooperation, information sharing and process coordination in the context of the business mission of the enterprise — will be central to this vision.

How will the simplicity of the electronic form enable it to become the conduit for complex business processes?

The "Traditional" Economics of Electronic-Forms

Forms Cost Study — Offset vs. Hybrid (offset plus electronic)

	Annual Cost		% Change
	Offset	Hybrid	
Forms use cost	$451,130	$451,130	0%
Forms design plus mgt.	$338,052	$313,785	7%
Printing cost	$494,822	$567,018	-15%
Paper plus materials cost	$438,777	$406,656	7%
Warehouse plus dist. cost	$373,780	$249,560	33%
Obsolescence cost	$130,574	$104,459	20%
Opportunity cost	$156,689	$125,351	20%
Total annual cost	$2,383,824	$2,217,959	7%

Annual Savings = $165,865

Source: Xerox Corp.

A one-year forms management study in the insurance industry concluded a change from traditional production methods to electronic alternatives could result in a savings of more than $850,000 over five years. Sponsored by Xerox, the study also showed a general lack of understanding of the forms creation and management process and of the true value of their forms inventory.

It's not just dollars. Because the off-set press is not efficient for short runs, printing many copies and storing them for later use results in an unbalanced supply and demand. To keep the presses operating, many print shop managers use slack time to print stock forms, contributing to the warehousing problem. Missed stock reorder points force print shops to run in overtime-laden, expensive rush mode. Warehousing results in the added cost of the warehouse as well as the extra labor required to run and manage it. Because dollars are tied up in inventory, opportunities are lost (i.e., capital that would be invested elsewhere if it weren't tied up in inventory cost).

Approximately 80 percent of the value in implementing forms automation comes from integration with electronic mail and workflow systems.

Cost Relationship Between Manual and Integrated E-Form Processing
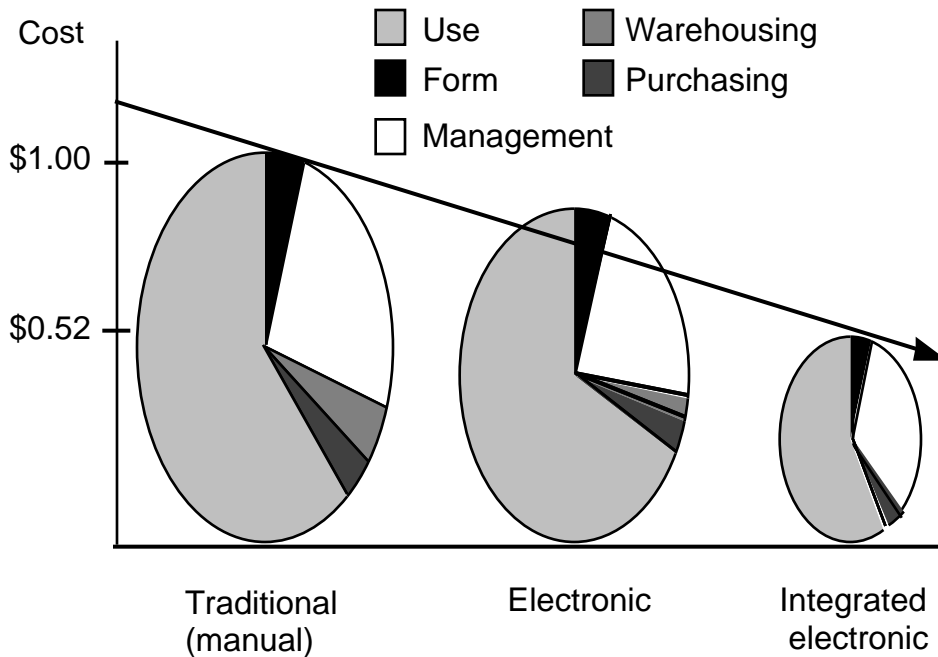
Source: Gartner Group

Key Issue: How will the simplicity of the electronic form enable it to become the conduit for complex business processes?
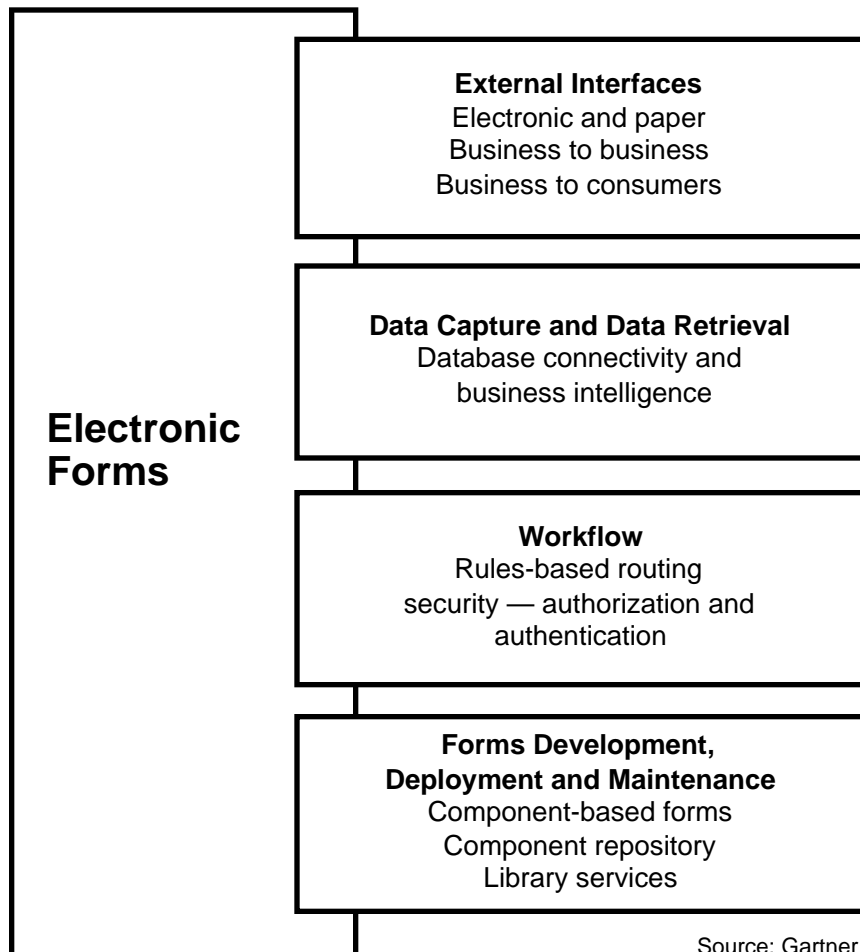
Traditionally, forms have been designed, printed, warehoused, distributed to users, filled in, routed, approved, then filed. Most organizations initially approach forms automation by creating forms electronically and printing them on demand. However, by integrating E-forms, E-mail and workflow, users can complete the labor-intensive functions of form distribution, fill-in, routing, transmittal and approval electronically, which can result in significantly greater savings. The workflow processes behind each form, and individual elements within it, will mirror company policies and procedures for processing using a set of routing and action rules that will be adaptable conditionally. This will allow end-users to adhere to the process without memorizing, or constantly referring to, manuals.

For every $1 spent on the traditional process, the organization spends $0.91 on the electronic forms-creation approach. With the integrated E-forms approach, for every $1 spent on the traditional process, a company will spend just $0.52.

E-form systems will increase in sophistication to meet a broader range of user requirements.

Electronic Forms

> **External Interfaces**
> Electronic and paper
> Business to business
> Business to consumers

> **Data Capture and Data Retrieval**
> Database connectivity and
> business intelligence

> **Workflow**
> Rules-based routing
> security — authorization and
> authentication

> **Forms Development,
> Deployment and Maintenance**
> Component-based forms
> Component repository
> Library services

Source: Gartner Group

Key Issue: How will the simplicity of the electronic form enable it to become the conduit for complex business processes?

Electronic forms used as a paper-reducing tool generally are developed to mimic electronically the processes underlying enterprises' paper-based forms. The real potential of electronic forms, however, lies in their ability to *reduce* the bureaucracy associated with paper forms rather than simply replicating it! To respond to new market requirements, vendors are enhancing their electronic forms products. *First*, electronic forms will shift from being stand-alone units to collections of forms "objects," allowing for rapid development, deployment and maintenance of E-forms applications. *Second*, improved connectivity with enterprises' messaging infrastructure, databases and EDI interfaces will allow E-forms to be used as the conduit for mission-critical applications. *Third*, E-forms products — designed as a low-end workflow alternative for simple, ad hoc administrative applications — will improve integration with workflow functions and therefore will help businesses attack productivity, quality and service with new tools and methods. Supporting technologies such as encryption and electronic signature also will play a key role.

Which vendors and products will be strategic to work management?

Gartner Group Workflow Market Definition
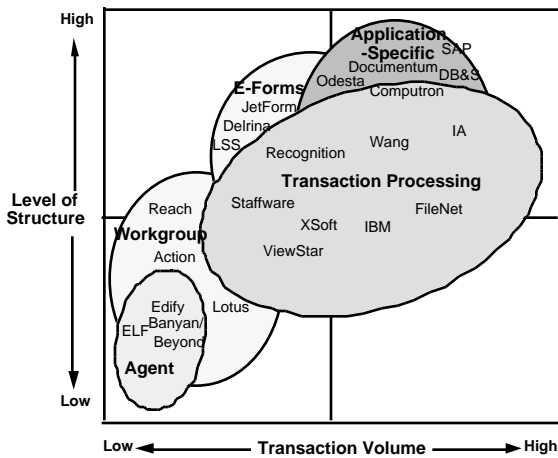
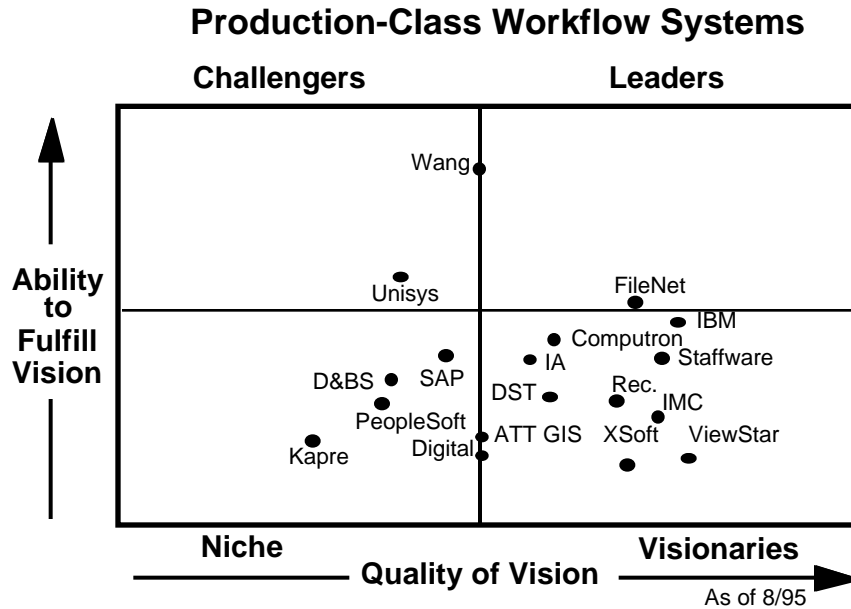|	Production/ Transaction	E-forms/ Work Group	Groupware Communic ·	Application Specific
End User	Back office Front office	Knowledge Front office	Knowledge Front office	Knowledge Front Office
Activity Automation	Routing/Filing Data entry Scheduling Communic.	Routing/Filing Deciding Communic. Scheduling	Communic. Filtering Deciding Scheduling	Assembly Scheduling Configuring Routing/Filing
Benefits	Trans. Velocity <Labor $ Cust. Service	Org. Speed Cust. Service <Labor $	Org. Memory Org. Speed Info Sharing	Prod. Quality Org. Speed <Labor $
Work Mgmt Intensity/Type	Structured Repetitive Hi Volume	Structured Repetitive, Med. Volume	Ad Hoc Project Low Volume	Structured Project Low-Med Vol.
Objects and Organization	Images Forms/Folders Host Files	E-forms Simple Doc	Simple Doc. Complex Doc.	Complex Doc Data Images
Technology Underpinnings	SQL,4GL, RPC, Image	Messaging, 4GL, SQL	Messaging SQL	SQL,4GL, RPC, Image
Cost to Acquire	$1,000 to $3,000 per user. Hard to separate	$100 to $600 per seat. (High leverage of PC LAN)	$600 to $1,500 basically undefined	$1,000 to $3,000 per user. Hard to separate

Source: Gartner Group

Application segmentation is important, since one size will not fit all for the foreseeable future. IS organizations should focus on the characteristics in these two charts to determine which applications have the biggest pay back, and the inherent implications of one targeted application class vs. the other. Attempting, for example, to solve transaction processing applications with an ad hoc tool could be a painful and expensive experiment for the IS function, as appealing as it might seem at the outset.

Production-class workflow vendors will continue to innovate constantly and focus on process logic, work objects and value-added packaging (0.7 probability).

Production-Class Workflow Systems

Challengers   **Leaders**

Wang•

Ability to Fulfill Vision

Unisys•   FileNet•   •IBM

•   Computron•   •Staffware

•IA   Rec.•

D&BS• •   SAP   DST•   •   •IMC

PeopleSoft

Kapre•   Digital• ATT GIS   XSoft   ViewStar•

Niche   **Quality of Vision**   **Visionaries**

As of 8/95

Key Trends:
IS Infrastructures**:** heterogeneous computing environment
Business modeling front-ends: BPR Tools, methodologies
Reporting tools
Consistent workplace: desktop/workgroup tools integration
Data and documents: work objects integration
Ready-to-ware workflow: templates availability
New pricing structure: workgroup computing model (3:1 ratio)

Source: Gartner Group

## Key Issue: Which vendors and products will be strategic to work management?

FileNet is successfully completing a major transition that has redefined the company in the software and services business, and its OO workflow product is doing well. IBM has been successful with its imaging/work management programs and is pursuing work management on a number of different levels with FlowMark. The Lotus acquisition will impact IBM's work management strategy. Staffware and ViewStar are good candidates for merger/acquisition. Wang's acquisition of Bull and Sigma's workflow and imaging products has transformed Wang into one of the largest imaging and workflow software providers in the world. In addition, the alliance with Microsoft increases Wang's potential to emerge as a sovereign imaging and workflow provider. Recognition is the longest-standing visual workflow proponent; Wang's merger with BankTec is expected to enhance the geographic penetration of the two organizations and offer savings through combined synergies. Many new and interesting offerings (client/server application vendors such as SAP, Kapre, PeopleSoft and Dun & Bradstreet Software) are in this market space, creating much confusion.

Through 1998, management should focus on organizational preparation for work management vis-à-vis workgroup computing.
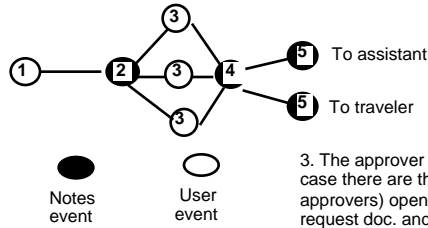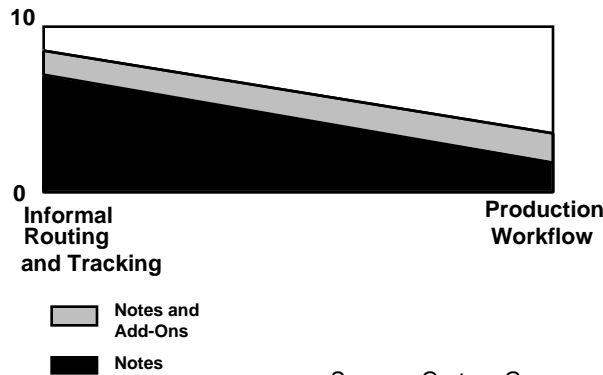
Example of a Lotus Notes Workflow

Notes event

User event

1. User (traveler or an assistant) enters a travel authorization request, which includes the name(s) of approver(s).

2. Notes creates a notification to be sent via E-mail to each approver, with a doclink to the request doc., and approval/reject buttons.

3. The approver (in this case there are three approvers) opens the request doc. and marks it Approved or Rejected. Supervisor approves and sends to purchase department.

4. Notes checks all approvals and changes the status of request to Approved or Rejected.

5. A background Notes macro sends notification to the user informing of the change in status.

To assistant

To traveler

10

0

Informal Routing and Tracking

Production Workflow

Notes and Add-Ons

Notes
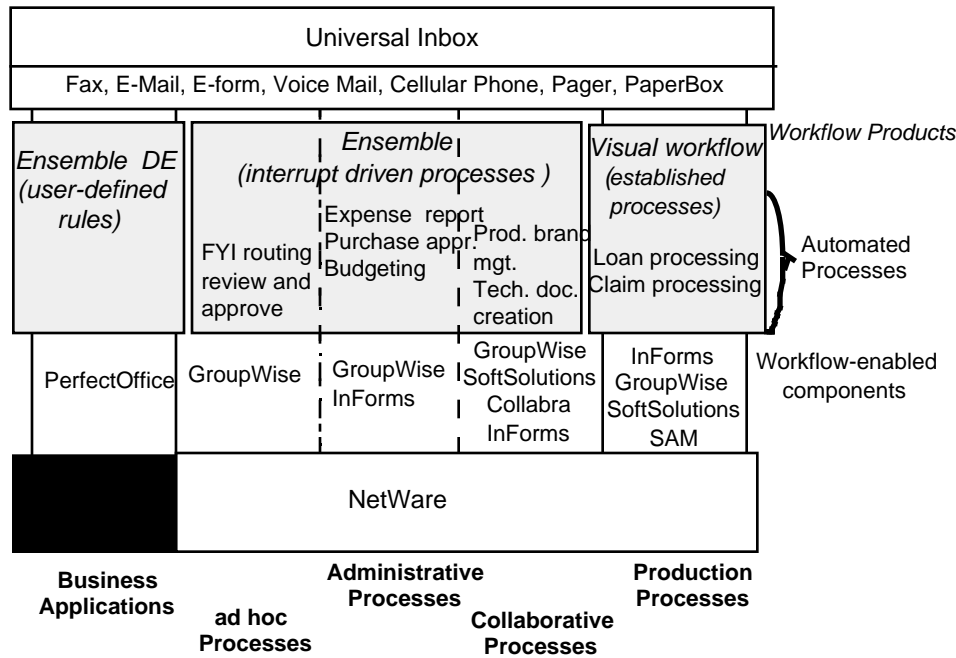
Source: Gartner Group

Key Issue: Which vendors and products will be strategic to work management?

Workgroup products are important in business process automation because of their role on desktop systems. Lotus Notes in particular is valuable because it bridges the production and office environments. For example, many production imaging/workflow vendors are integrating their products with Notes so production images and production system information can be sent to a Lotus Notes user. Notes and Microsoft Exchange will define office information systems, but they will not be document management or workflow products on their own. We believe the appeal of workgroup products as workflow systems should be considered in light of some of their constraints: Usually, their workflow models are simplistic compared to production-class offerings. They do not offer dedicated workflow engines. There are no workflow authoring tools, found in the majority of workflow packages, nor the sophisticated queue-management features of production workflow systems. Other deficiencies include business analysis, simulation and reporting features that are increasingly relevant in business process automation efforts.

Novell will effectively ride the relationship with FileNet to emerge as a top-tier provider of workflow software (0.7 probability).

Reader Notes

Novell Workflow Strategy

Universal Inbox
Fax, E-Mail, E-form, Voice Mail, Cellular Phone, Pager, PaperBox

Workflow Products

Ensemble DE (user-defined rules)	*Ensemble (interrupt driven processes)*			*Visual workflow (established processes)*
	FYI routing review and approve	Expense report Purchase appr. Budgeting	Prod. brand mgt. Tech. doc. creation	Loan processing Claim processing

Automated Processes

PerfectOffice	GroupWise	GroupWise InForms	GroupWise SoftSolutions Collabra InForms	InForms GroupWise SoftSolutions SAM

Workflow-enabled components

NetWare

Business Applications **Administrative Processes** **Production Processes**

ad hoc Processes **Collaborative Processes**

Source: Gartner Group

Key Issue: Which vendors and products will be strategic to work management?

Novell and FileNet's announcement of a development and marketing/sales agreement for workflow software will enhance FileNet's marketing and distribution efforts. It also validates Novell's decision to deliver work management software that spans workgroup and enterprise requirements. Novell's need to increase the appeal of its NetWare and groupware product, and FileNet's increasing influence in the market for production-class workflow software cemented the deal. This partnership provides Novell with an important tool to achieve better positioning in the workflow/workgroup market. Workflow and groupware product initiatives will be a strategic growth area for Novell, and in our opinion Novell has the potential to emerge as a top-tier provider of workflow software. To achieve maximum success, Novell (in conjunction with the selected partner) must meet ambitious delivery schedules during the next six to 12 months and create a competing image in the workflow market.
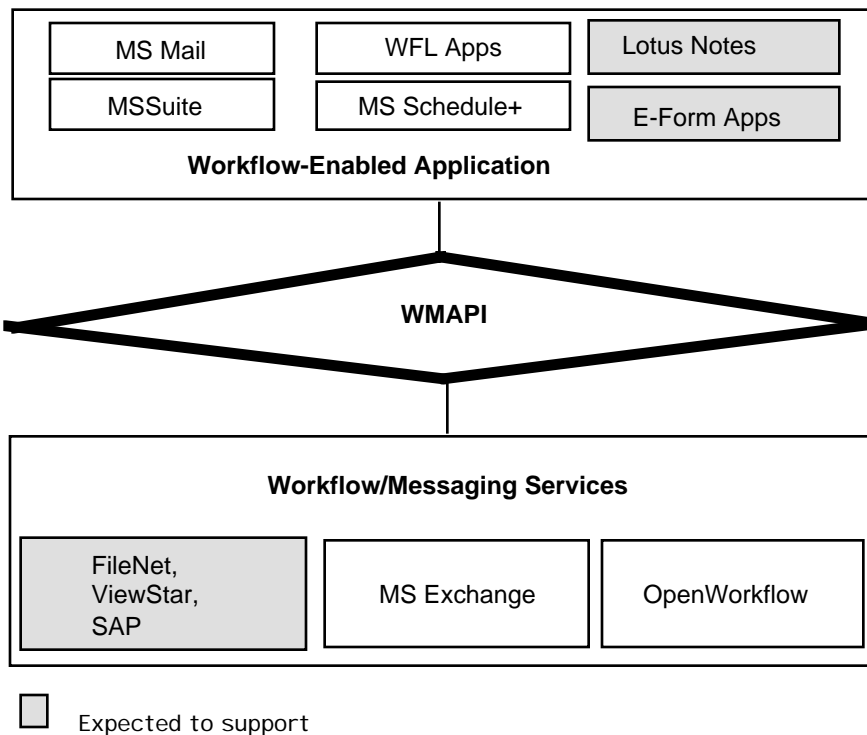

Reader Notes

Starting mid-1996, WMAPI will be the most common interface between desktop application and the underlying work management system on Windows (NT-Win95) operating systems (0.8 probability).

By 1996, traditional production-class workflow vendors will announce support of WMAPI in their offerings (0.8 probability).

MS Mail	WFL Apps	Lotus Notes
MSSuite	MS Schedule+	E-Form Apps

Workflow-Enabled Application

WMAPI

Workflow/Messaging Services

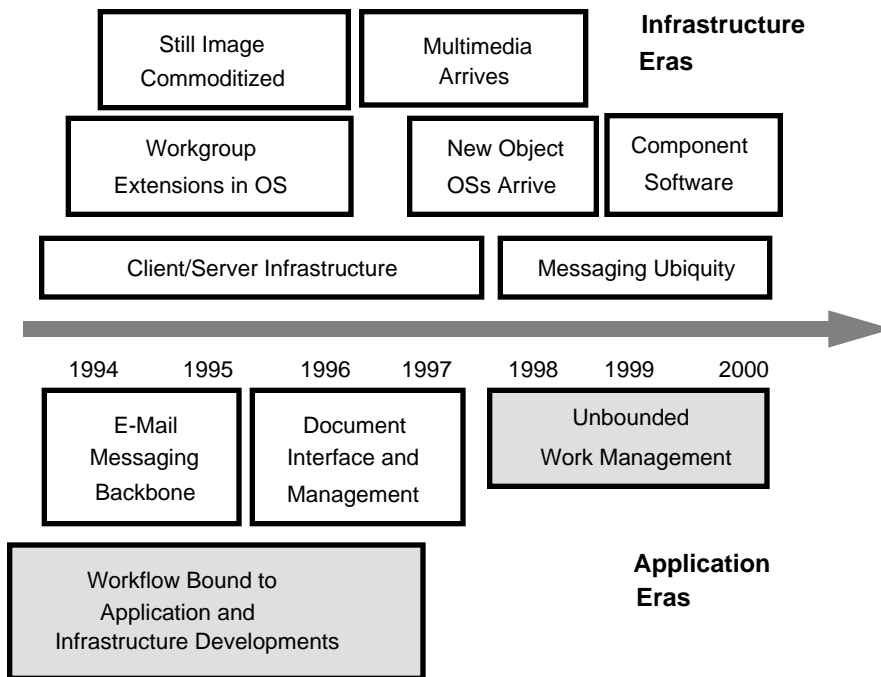| FileNet, ViewStar, SAP	MS Exchange	OpenWorkflow

☐ Expected to support

Source: Gartner Group

Key Issue: Which vendors and products will be strategic to work management?

At the AIIM Conference 1995, Microsoft and Wang announced a partnership in the areas of imaging and workflow. Under the alliance, Wang's imaging and workflow components will be incorporated as standard features in *future* releases of Windows95 and Windows NT. Microsoft and Wang will cooperate in defining work management APIs to enable applications to use workflow functions. These APIs, supported by both Microsoft Exchange and Wang's OpenWorkflow, will be available to all vendors. We believe this initiative will accelerate the deployment of workflow automation software as a mainstream application for client/server computing.

Through 1997, work management penetration will be impeded by the absence of client/server infrastructure and interoperable, distributed middleware services such as database, messaging, document management and storage (0.8 probability).

Technology Evolution

		Infrastructure Eras
Still Image Commoditized	Multimedia Arrives	
Workgroup Extensions in OS	New Object OSs Arrive	Component Software
Client/Server Infrastructure	Messaging Ubiquity	

1994   1995   1996   1997   1998   1999   2000

E-Mail Messaging Backbone	Document Interface and Management	Unbounded Work Management

Application Eras

Workflow Bound to Application and Infrastructure Developments

Source: Gartner Group

Key Issue: How must IS organizations change to plan, implement and support work management systems?

Most work management systems aggressively exploit the client/server computing paradigm. At the core of work management systems are various client/server technologies such as remote procedure calls, advanced uses of relational database technology and object programming methods that glue the system components together. At least half the software code underlying the complex work management systems run on servers. Today, we usually see a rich combination of Unix and NT server code with Windows desktops. There are many variations on platforms, grades of function and client/server exploitation.

Work management systems penetration will be slowed by steep learning curves in human factoring and organizational change management.

IS Organization Myths

• People resist change because they are stupid.

• People will be forced to adapt, so forge ahead.

• Management always knows best.

• Electronic is always better than manual.

Organizational Realities

• Systems are difficult and costly to support.

• People must see immediate 2-to-1 improvement in information processing capabilities to justify disruptive transition costs away from old system.

• Management does not always understand life in the trenches, and some managers are bad.

• Some processes are better left uncodified given their innate complexity,

Source: Gartner Group

How must IS organizations change to plan, implement and support work management systems?

Work management systems have a major impact on how individuals and workgroups work. Work management implementations without line and human resource management seriously considering the impact of work management systems on the labor work force are dangerous. Huge reallocations and dislocations of people are expected during the next five years. IS personnel cannot bear the awesome burden of job reapportionment alone. These systems must be tied into job design and training programs. (Some companies have chosen to implement work management systems totally from the human resource perspective, not from a task or smart forms/flow perspective.) IS professionals should not assume solutions that are technically right are the right solutions — end-user customers and markets ultimately must decide. Users must see tangible evidence of job improvement via expansion of computer technology. The UI is extremely important turf.

Work Management Industry Scenarios — 1998

Scenario 1: Production vendors dominate (0.3 probability)

Workflow management market will be driven by dedicated production systems vendors that constantly innovate on top of client/server computing environment and focus on process logic, work objects and value-added packaging.

Scenario 2: Services providers dominate (0.3 probability)

Services providers (VARs, consulting and system integrators) will continue to be key in production-class workflow and will be the most efficient source of workflow products and services.

Scenario 3: C/S applications, database and tool vendors dominate (0.2 probability)

Workflow solutions will emerge as logical extensions of database, development tool and client/server package vendors and become embedded in specific applications.

Scenario 4: Workgroup vendors dominate (0.2 probability)

Workflow management will be subsumed gradually by workgroup computing extensions such as electronic forms, electronic mail and groupware extensions.

We expect new classes of players (i.e., system integrators, database, client/server applications, groupware and tool-provider vendors) to emerge during the next three years, forcing production-class workflow vendors to change their strategy and reshape the market dynamics. As result, we expect: 1) production-class imaging and workflow market consolidation; 2) a wider range of alternatives; 3) impossibility of implementing leading-edge enterprisewide work management system by relying on a single vendor; and 4) value-added service providers will become an efficient (but more expensive) source of work-management products and services.