The Difference Between Workflow and BPR

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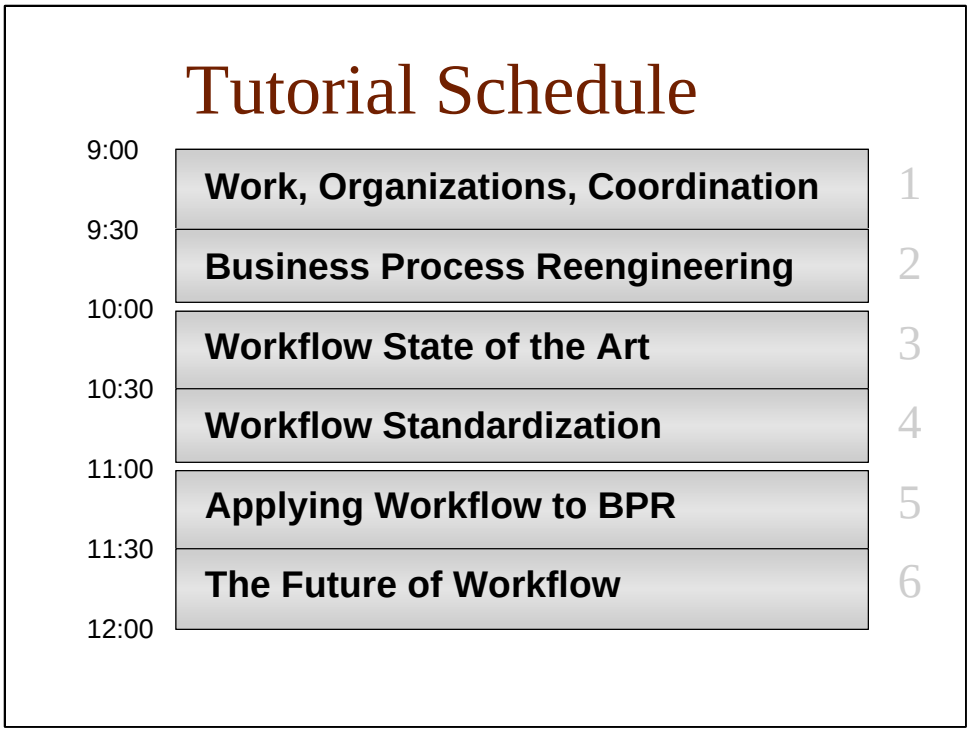
Few things have recently been hyped more than Business Process Reengineering (BPR). "Reengineering the Corporation" by Hammer and Champy has by far outsold any other book on management practice. BPR is both much talked about, and much misunderstood, but nevertheless a significant trend today.

Workflow is quite possibly the fastest growing software market today, having tripled in size for two years in a row. In such an expanding market there is bound to be a lot of differences between the products, as well as more misunderstandings.

Both BPR and workflow deal with processes, so it is natural to assume that workflow might be the perfect tool for implementing BPR, especially if you believe much of the workflow marketing literature. While workflow has a lot to offer, it also has a lot of technical limitations. It will work well for some organizations, in some cases, but it might fail to offer any benefit in others.

This session will cover the ways that workflow can be used to support a BPR effort, what kinds of organizations will best fit this effort, and what kinds of tasks should not be implemented on workflow at this time.

There is, after all, a lot of difference between workflow and BPR.



The first section will allow us to step back from the bits and bytes of computer technology to afford us perspective on the problem that we are really trying to solve: how can computers help people work more effectively together. Research can help dispell a lot of myths about how organizations work.

The second section will give an overview of BPR, and at the same time try to cut through all the hype that normally surrounds it.

Workflow is a rapidly changing technology. Section 3 will cover the features that you can now expect to see in workflow, especially with respect to the needs of BPR.

Many organizational issues with workflow will center around workflow system interoperability. This sections will go into a little more technical detail about standards activities of the Workflow Management Coalition.

Section 5 then examines how workflow helps in the BPR process, but more importantly, where it falls short.

Finally, what would a tool that is designed especially for BPR do for you. When evaluating tools to support BPR, look for these features.

This tutorial is structured in this manner to allow you flexibility to optimize your time. I will work hard to stay on schedule, so that you can step out if you choose during sections that you are already very familiar with.

Part 1 covers the big picture:

- What are the goals of Workflow and BPR?
- Why are we automating work?
- What makes white collar work different from blue collar work?
- What are the difficulties, and why?

Hammers and Nails

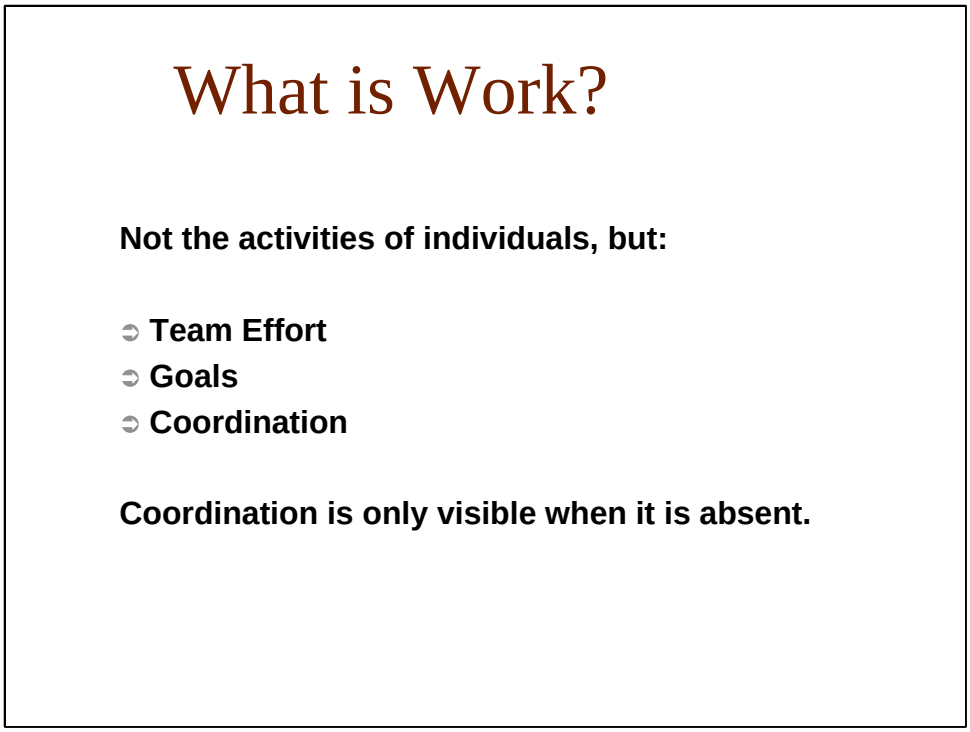
- **When all you have is a hammer, many problems start to look like nails.**

Workflow systems and office information systems are designed primarily by computer scientists. When asked what is needed to support group coordination, the answers from this group reflect the kinds of things that they are familiar with. Recommendations for “distributed databases,” and “transaction processing,” and “messaging” are common.

The bulk of experience in computer science comes from learning how to control machines and data files of various sorts. It is quite dangerous to assume that one can control office work being done by humans in the same way.

Those practicing BPR are asked to take a fresh look at the problem, and not to simply automate existing procedures. Similarly, the design of groupware should not simply be a matter of gluing existing individual productivity tools together. Let us start with a fresh look at how organizations work, what the needs of individuals are within organizations, and what they need in order to coordinate their actions.

Groupware is a new field. We need to think outside of the box.



The people in an office are a team. Actually, they are each part of many teams which overlap with each other. The members of a team have common goals that they need to accomplish. Team members will perform activities to achieve those goals in a concerted manner.

The tricky part of this is achieving the coordination. Good coordination is invisible. It is only the lack of coordination that becomes obvious for all to see.

One way to achieve coordination is to ridgidly define the jobs. Another way is to appoint a leader who makes coordination decisions for the group. A third, much rarer, possibility is a self managed team. Most real world teams employ a combination of all three methods. In spite of these methods for coordination, the bulk of the day-to-day decisions are made by individuals alone. These decisions are so natural and second nature that we simply call it "common sense."

It is at the level of common sense that workflow modelling gets difficult and complicated. For common sense to work, individuals often need hints and cues that are not accounted for in simplistic process implementations. The workplace involves a lot of rich communications which are so natural to use that we may not be aware of them.

Coordination Questions

- **What needs to be done now?**
- **What are the supporting materials?**

- **Who wants it done?**
- **What are the options at this point?**
- **What will happen after this?**
- **What has led up to this point?**
- **Who else is involved?**

When a person approaches a job, assuming that they have the skill to do the job, they might ask these questions to coordinate their activities with others. The first two are obvious questions about the work. The rest of the questions at first seem superfluous, because in normal work situations they are rarely explicitly expressed. But knowledge of the plan is critical to the quality of the work being done.

Coordination Questions

Work

- What needs to be done now?
- What are the supporting materials?

Plans

- Who wants it done?
- What are the options at this point?
- What will happen after this?
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- Who else is involved?

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Plans Help Model Work

- **Expression of future possible actions.**
- **Tell who might do those actions.**

Extensions:

- **Communicates current status.**
- **Keep a list of past actions.**

Discussions of work and BPR need to center on discussions of plans. The standard workflow term for a plan is a "Process Definition."

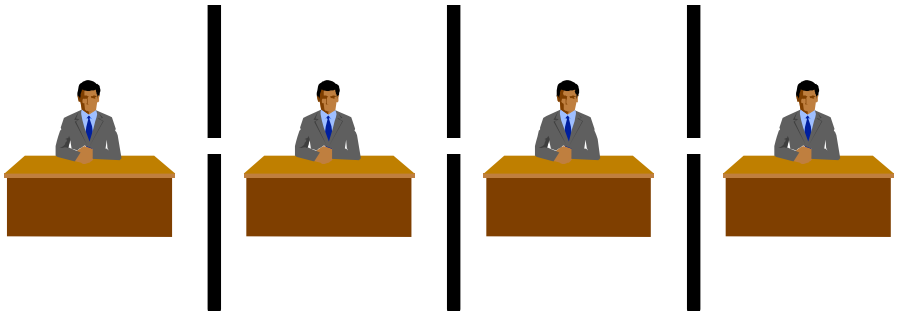
A plan is an expression of what is happening; it is more like a document than a program. The plan is designed to be read by humans, as a vehicle to explain what the process is. In Regatta, it is also used to "enact" the process and to generate task lists for people.

Plans are the key that allow coordination, understanding, and change of processes.

Why Model Work?

- **Automating work on a computer requires a model for how that work is done.**
- **The ability for a system to support work depends on how well that model matches the actual work being done.**
- **To answer the question of whether workflow can support BPR, we need to compare the workflow model of work, with the BPR model.**

Is This How Work Gets Done?



Many existing workflow systems are based on the assumptions that people work mainly individually, all work gets done on a document, and that document is passed from person to person with minimal interaction.

Most workflow systems are merely extensions of capabilities that the computer systems had already provided. For example, if the system handles documents well, the simple addition of routing this document from person to person is added and called workflow.

We need to start at a more fundamental point: “What is work?” How do people coordinate their actions on a day-to-day basis?

Or is Work Like This?

Most work looks more like this. The point is that there are multiple conversations going on. People can overhear others and are aware of what others are doing - even if not materially involved in the conversation.

The conversations can be about documents (or other artifacts), but the documents are not even required, and in any case not necessarily the center of discussion.

This view of work is fundamentally different from that of the last page. Can such a picture of work be supported?

Office Work is Situated

- **Many of our daily activities lack the rigorous repeatability required for a predefined process, yet have elements of process.**
- **Work is seen as a collection of activities, some of which are enabled at the current time.**
- **Focus on activities as a universal concept.**

Computerzation of factory work has been fairly successful. Factories have seen tremendous benefit from automation.

Automation of office work (managment, executives, writers, lawers, salespeople, etc.) have not benefited significantly from automation. This is due to a fundamental difference between office work and other more routine kinds of work.

While there are processes and procedures that people follow, the office worker is much more flexible in following these procedures.

The difference is made clear when attempting to code these procedures into a computer program. It is not possible to write a strict step-by-step process that someone must follow in order to write a book, or close a contract, except in the most general way.

The unique quality of office work is a product of the intelligence of workers to do the right thing at the right time.

Situated Processes

- **Depend upon people involved**
- **Depend upon specifics of instance of task**
- **Change when situation changes**
- **May be Competitive Advantage**
- **May need to change in response to competitive pressures**
- **Can not afford to be fixed into a single plan**

Situated Action

- **"[The term 'Situated Action'] underscores the view that every course of action depends in essential ways upon its material and social circumstances.**
- **Rather than attempting to abstract the action away from its circumstances and represent it as a rational plan, the approach is to study how people use their circumstances to achieve intelligent action."**
  - **» Lucy Suchman, 1988**

The actual activities employed for a goal can only be identified within the context of the specific instance of the process. Users often talk about workflow not being "flexible" enough. Chances are, they are discovering that the process they are trying to implement is a situated process.

It is not possible to create a plan that will describe in great detail the work for all such processes. There are parts of the plan that must be changed or otherwise accommodated for the specific situation.

We can not expect a perfect plan will ever be developed that will fit all situations.

Much of the research on situated action comes from a field of sociology known as "Ethnomethodology".

2 Kinds of Processes

- **Formal Process**
  - **Often automated as an application dedicated to this process: Bank Teller, Accounting, Order Processing**
  - **Workflow (if used) is just a way to help distribute the application among users**
- **Situated Processes**
  - **Users use standard productivity tools, WP, SS, DB, or applications specialized to the task and not the process.**
  - **Workflow integrates tools specialized for user's task into a process.**

Some of the activities in an office can be rigorously formalized. These processes are well understood and can be performed repeatedly. Unfortunately, these processes are only a small part of what actually happens in an office.

Examples of formal application processes include: banking applications, such as loan applications, insurance claims processing, product order fulfillment, etc.

Most work in the office still requires regular application of human intelligence. As automation in the office gets easier, more and more of the work found there will be of the situated type. I use the term "Situated Processes" to mean that these processes depend in inherent ways upon the situation that they are in. It is not possible to abstract a situated process away from the details of the situation.

Examples of situated processes are: large contract negotiation, court and legal processes, product design, marketing activities, book and other media authoring, etc.

No Fixed Plan

"To fill this gap between formal theory and wisdom, we need a framework that recognizes that the set of activities to be performed is not given in advance, except in a most general way - that one of the very important processes in organizations is the elaboration of this set of activities, and determination of which precise activities are to be performed at which precise times."

» March & Simon, 1959

Another well qualified source saying that it is not possible to describe a plan completely outside the context of the specific instance. Part of the work of the organization is to map in real time the vague planned activities to the specific performed activities for every situation.

If there is indeed no fixed plan, one might indeed ask why people commonly believe that such a plan does exist. Indeed, we have a concept for a plan which is not only useful but necessary for the proper functioning of an organization. Why can't we simply code this plan into a computer program and have everything automated?

The answer to this lies in understanding exactly what a plan is. It is not a rigorous set of actions to follow; it is not a computer program. It is more like a map.

Who Knows the Process?

- **Trainers can teach the basic skills, but not the specifics of an activity.**
- **Co-workers can observe the activity, but can not know the internal rational behind decisions.**
- **Even the worker is not completely aware of all actions or why particular choices are made.**
- **The answer: No one!**

The BPR team gathers people together to design an optimal process. The team members draw on their own knowledge to come up with the right process.

Only one problem: We don't know ourselves how we do things.

This may seem at first preposterous, but this conclusion bears out in studies of work. We all certainly know at a superficial level what we do, but modeling work in a computer requires a level of detail that we are not used to dealing with. Can it be possible to know the task to the level of detail necessary for workflow automation? How can this detail be captured?

Job is Largely Unknown

- **"The skilled carpenter knows just how a given variety of wood must be handled, or what type of joint will best serve his purpose at a particular edge. To say that he 'knows' these things is not to say that he can put these ideas into words. That is never entirely possible. ... The practitioner's knowledge of the medium is tacit."**
  - **» Ulric Neisser, 1983**

My example of tacit knowledge is the knowledge of how to keep your balance on a bicycle. If asked, a bike rider can not write down how to do this. This is because the bike rider does not learn how to ride by reading a book on the subject. Instead, the hopeful rider gets on the bike and tries, occasionally falling, and then avoiding whatever it was that made them fall.

This is how people learn processes in the office. They follow a set of vague, incomplete guidelines for how to get something done, and when they "fall down," they avoid making the same mistake. Why not make a system which instead of trying to avoid the mistakes from the beginning, helps them to discover and to respond to mistakes (exceptions). This would truly support work, instead of automate it. While it sounds contrary, if the system can help you remember your successful processes (plans), it in effect learns the correct way to execute the process as you work.

Plans: Resources for Action

"Just as it would seem absurd to claim that a map in some strong sense controlled the traveller's movements through the world, it is wrong to imagine plans as controlling actions."

» Lucy Suchman, 1988

Plans should not be treated like programs to be executed by the organization, but rather as expressions of what might or should happen. It guides the user through the possible options at each point, but also allows the user to add options and stages if they are needed.

Therefore, it is the job of the BPR team to provide new "maps" for workers to use in the coordination of their activities. It will not be possible to predicts exactly what every worker will do in every situation, but the plans give the workers a framework in which to coordinate their actions with others.

Planning is like Communicating

It is possible for people to talk to each other during a thunderstorm:

"Our communications succeed in such disruptive circumstances not because we predict reliably what will happen and thereby avoid problems, or even that we encounter problems that we have anticipated in advance, but because we work, moment by moment, to identify and remedy the inevitable troubles that arise."

» Lucy Suchman, 1988

The goal of some workflow systems is to, in a way, teach the computer system to "understand" the work being performed. In this way a remote programmer constructs the process description, and then is absent when the activities are being performed. The value of the process description is directly related to how well the description matches the real process. Any failures are very hard to deal with.

Researchers have found that communication about plans is quite similar to natural language communications in general. Computer representation of plans may be as intractable a problem as computer recognition of speech.

The answer to supporting organizations is not to represent the work, but only the communications that need to proceed for people to coordinate work. Because communications is a two-way exchange of information, if a user does not understand the task, the plan designer is available to clarify the request, or to change the plan. Assigning work needs to be a bi-directional activity.

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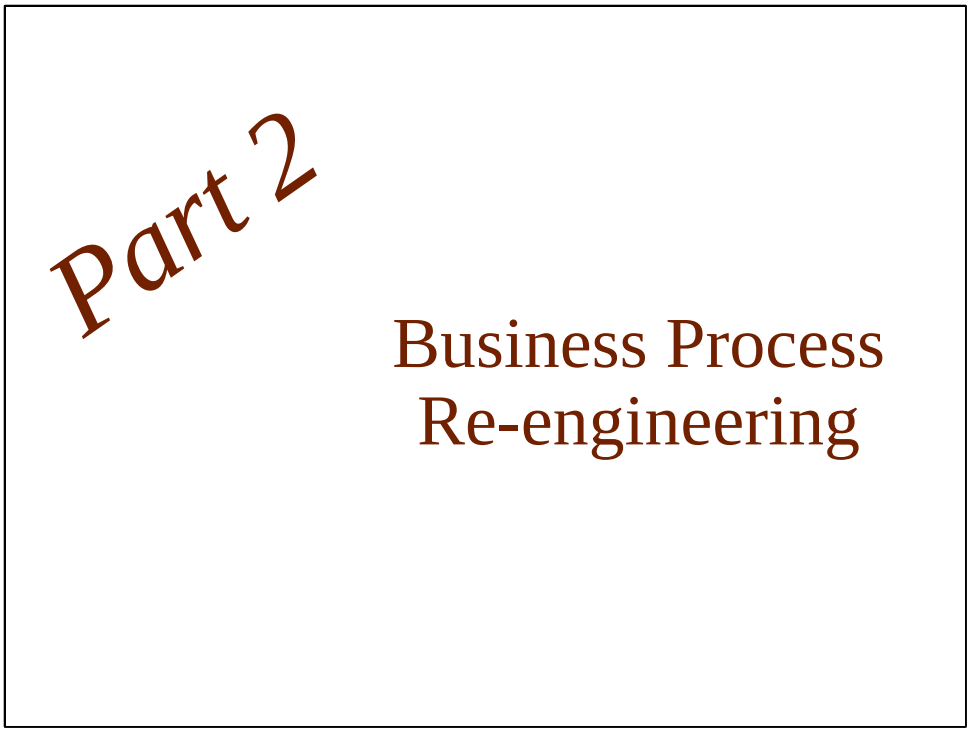
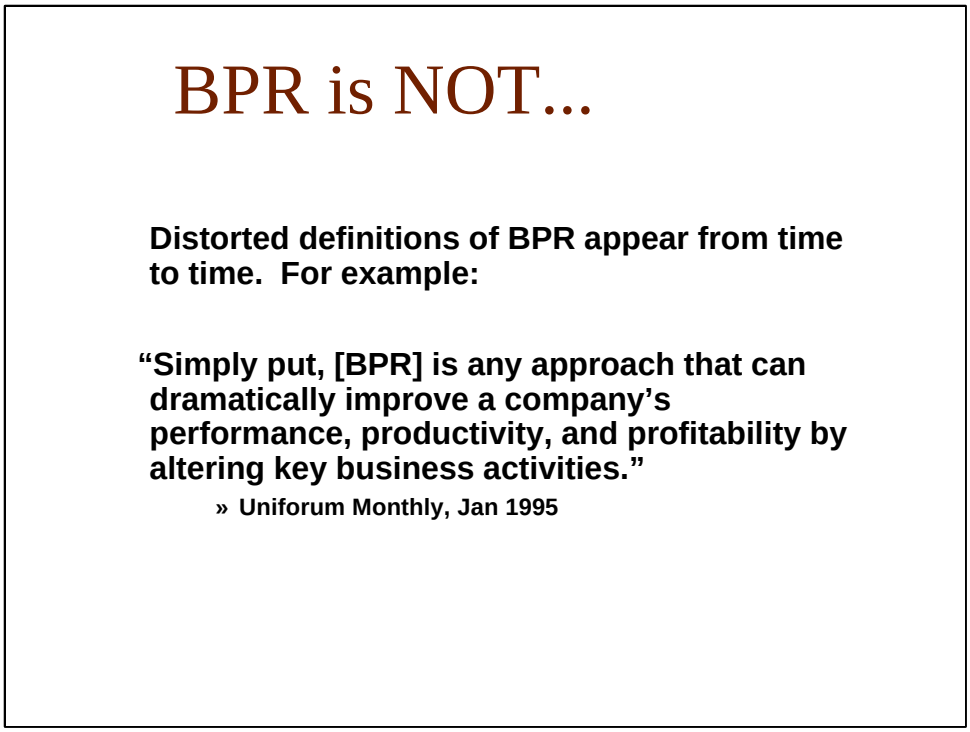


Part 2 is an overview of BPR.

- Where did it come from?
- Why did it appear now?
- What is the difference from other management trends?
- Why is it collaborative?



When a buzz-word gets popular, everyone wants to bend its meaning to suit their own purposes. The above quote is a good example of forces contriving to distort the meaning of BPR. The above definition might be useful if your goal is to claim that getting a new Unix system might classify as BPR, but it is not the right definition.

BPR has gotten a bad reputation with much of the public at large because of the use of the term as a euphemism for down-sizing or layoffs. Since the purpose of BPR is to make individuals more effective, it is undeniable that management will see this, at least in the short term, as a way to do the same job with less people. (In the long term, a more efficient company should be more able to grow than its competitors.) While BPR may be associated with layoffs, layoffs do not necessarily count as BPR. Without the restructuring of the company along the lines of customer driven processes, you do not have BPR.

BPR is not simply any improvement in the way you work. There is a very specific approach that must be taken.

Key Elements of BPR

- **Process Orientation**

  Business must be viewed as being composed of processes which satisfy customer demands.

- **Quantum Leap due to I.T.**

  The newly designed processes must consider, from a fresh perspective, how Information Technology can best be used.

The main benefit of BPR comes from the relationship between the process and the product it produces: the better the process, the better the product. Some Japanese believe that if you pay attention to the quality of the process, the quality of the product takes care of itself.

A second benefit comes from making better use of IT, and redesigning processes to involve fewer people and take fewer steps.

A third benefit is that the new redesigned jobs are more enriching to the workers. No longer are they a cog in the machine, making one indiscernible part after another, but someone who is taking an active role in satisfying a customer, whether it be an internal or external one. This is an improvement over the trend which scientific management brought to the workplace.

Companies are being forced to adopt BPR measures because of the tremendous pressures of competition from those companies who already have. In some cases adoption of radical change has been used in a desperate, yet successful, measure to avoid closing down.

Customers are more demanding and are getting what they demand more often. Successful companies are outmaneuvering others by discovering and providing to customers exactly what they want. This raises the stakes for everyone. Companies need to be able to respond quickly and effectively to changes in customer demand. The ability to respond to customer demands, and to lower the costs of doing business is giving those companies a competitive advantage.

Productivity Paradox

- **Billions of $ spend on Information Technology**
- **No evidence at aggregate level of any increase in white collar productivity.**

Why?

The so called "Productivity Paradox" is the lack of evidence at the aggregate level indicating improvements in productivity or profitability that can be attributed to the increased use of Information Technology within businesses today.

Several reasons possibly exist for this. It may be that the benefits of IT are not at this time measurable in traditional ways. For example, the satisfaction of being able to access one's bank account without leaving the home may be a real benefit to some people, but this satisfaction does not show up on any measure of productivity. Competition may be forcing companies to increase product quality or to lower prices, and through the use of IT they may now be able to do it, but no increase in profits is seen. The increase is in the intangible aspect of product quality. The heavy investment in IT may just be a cost of staying in business.

The most disturbing possible explanation for the lack of increased productivity is the lack of real impact from IT in firms. Many firms have applied IT to areas with low payoff, such as elaborate financial accounting systems. Too often IT is laid on top of existing inefficient practices in such a way that the new technology can not be used to any advantage. The MIT 90's study also found that the change was managed superficially and was not absorbed into the organization. In short, IT has been added, but the organization has not made effective use of it.

Management in the 90's

"In order to gain the improvements in productivity that we seek, it is necessary to rethink the processes that are currently being used and, in many cases, to transform the organization dramatically to gain the improvements in productivity that IT makes possible."

» Stuart E Madnick, 1991

The MIT90s study was conceived by the MIT Sloan School of Management in 1984 as a close collaboration between academic researchers and representatives of 10 major corporations, which included American Express, Digital Equipment Corporation, ICL, Eastman Kodak, General Motors, British Petroleum, MCI Communications, and two U.S. government agencies.

The research program was charged with the task of investigating the impact of new IT on organizations with the goal of determining how the organizations of the 1990's -- and beyond -- will differ from those of today. This book is not about office automation, computer integrated manufacturing, or advanced networking such as ISDN. It is about how these new technologies are changing the way people work, the way society's major organizations are structured, and the way corporations will collaborate and compete in the years to come.

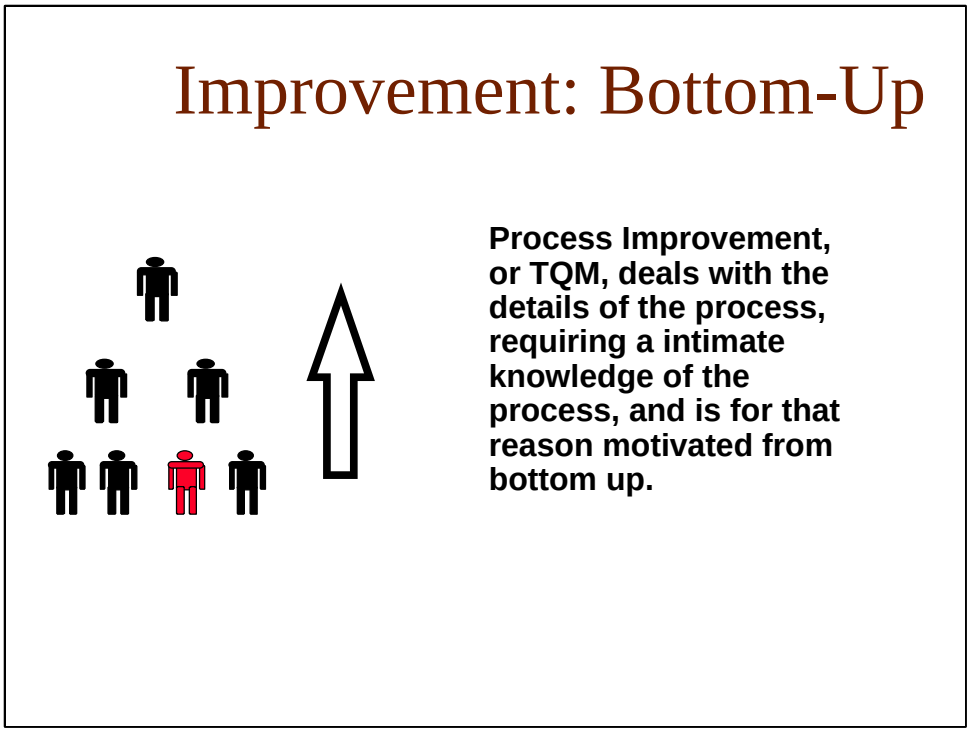
The study was concluded in 1991 with the publication of their final report in the form of this book by Michael S. Scott Morton, one of the major contributors to the study. Each chapter was written by different members of the study working from the perspective of their own discipline while being organized to build to an orchestrated overall conclu-sion.

BPR vs. TQM

- **BPR**
  - **proposes dramatic change**
  - **change due to information revolution**
  - **Synonym: Process Innovation**
- **Total Quality Management (TQM)**
  - **gradual change**
  - **any kind of change**
  - **Synonym: Process Improvement**
- **Both BPR and TQM**
  - **Have a process orientation**
  - **Require input from workers themselves**

The central concept behind Business Process Re-engineering is that while information technology offers us new ways to increase efficiency of office workers, we should not simply apply computer technology to automate the procedures of working, but that fundamentally new ways of working can be supported. Business processes need to be reexamined from a fresh perspective in order to realize the full promise of information technology.

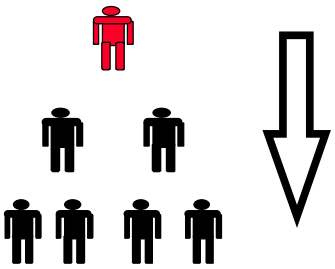
Many analysts point out that BPR is similar to TQM (Total Quality Management), or to Kaizen, the Japanese term for continual improvement of processes. BPR is not simply a new name for these well known techniques; the unique aspect of BPR is that the presence of Information Technology (IT) deployed in the last decade fundamentally changes the way we do work. Information can now be said to be location independent. No longer must the customer come to the company, but instead in a very real and dramatic way, the company can come to the customer. This more than anything else demands that we take a fresh look at how businesses are run.



BPR's dramatic redesign of processes does not replace the continual change of process recommended by TQM and Kaizen. The necessity for both kinds of change is outlined best by Thomas Davenport, who defines two terms: process innovation for major shifts, and process improvement for minor shifts. The exact dividing line to differentiate innovation from improvement is never specified.

We propose that the difference between a major and a minor change depends upon whether the part of the organization taking part in the change loses its identity as a result of the change. A good measure for this is whether people actually change job titles. For example, a writer may participate in many improvements in processes; as long as the writer remains a writer the changes can be viewed as process improvement. But as soon as a change involves job titles, for example the writers become editors, proof-readers, or something else, then we see change that qualifies as process innovation. The same is true with organizations; if a department changes its purpose, it is process innovation. This way of distinguishing the two cases is useful in discussions of BPR, but it has particular significance to how the workflow might be used.

Innovation: Top Down

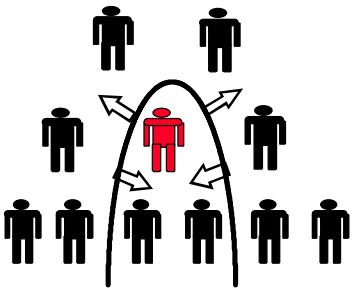


Process Innovation, or BPR, proscribes a radical change that redefines the processes from a fresh perspective. This must be motivated and supported from top.

If we examine the difference between innovation and improvement further, we discover that while improvements might be motivated from within the organization in a bottom-up fashion, process innovation almost always must be motivated from the very top or outside of the organization in a top-down fashion. This follows from basic human nature: redefinition of job identity is very uncomfortable for the people involved, and is highly unlikely to happen in a bottom-up fashion.

In spite of the stark differences of these two kinds of change, it is quite possible, maybe even common, for a given change to be viewed as both innovation and improvement. It depends upon your point of view. Consider the case of a single department that completely redefines how it handles a particular request. Within the department there may be a complete change of job functions and processes, but as long as the department responds to the same requests with the same results, these changes will be viewed by those above the department and those in other departments as being an incremental improvement.

Reality: Middle-Out



Those above or outside of an organization might view a given change as incremental, while those inside the organization might view the same change as radical innovation.

It all depends upon your perspective.

For example, a product manager may rely upon the accounting department for purchasing materials for a product. From the point of view of the product manager, the accounting department performs a single step in the process of completing a product. The accounting department might discover a dramatic way to re-engineer the purchasing process such that it can be done faster with fewer people by redefining the jobs within the department. That change within the department clearly qualifies as process innovation, but as long as they provide the same service to the product manager, the product manager sees the increased performance as simply an incremental improvement in the same basic process of building a product. The president of this company would see this improvement as being initiated in a bottom-up manner, because the executives did not need to be involved.

The fact that your point of view determines whether a change is viewed as evolutionary or revolutionary, as bottom-up or top-down, as innovation or improvement, has some important design considerations for the technology to support this change.

BPR is Collaborative

"The actual work of reengineering ... is the job of the reengineering team members."

"Insiders by themselves, however, are incapable of reengineering a process"

- **Hammer and Champy**

BPR and TQM are similar also in that they both proscribe involvement of the workers themselves. Both approaches rely on intimate knowledge of the existing work, as well as an influx of ideas from outside to open up new ways of working.

BPR is a collaborative activity. People must work together in order to draw up the plans. Surprisingly, most workflow systems have no support for this part of the activity. The plans (process definitions) are assumed to be drawn up and installed "before the work begins". BPR is a process that involves developing plans. This is a key point in understanding how workflow and BPR are related.

BPR supports Individualism

Organizations are urged to

- **Form their own BPR teams**
- **Find the process right for them**

It does not propose that there is one best process for everybody

One of the key aspects of BPR is that it does not define how the work should be done. It assumes that workers internal to the organization, together with outsiders, can find the right process for that organization.

In doing so it explicitly recognizes that processes will be different for different organizations if you want to find an optimal process.

Organizations are composed of smaller organizations, which also have differences requiring differences in their processes. It would be a fallacy to assume that a single workflow process definition will work for every organization, or even across a single large organization.

Yet this is exactly the assumption that is made in many workflow implmentations. The motivation is clear: if a single process definition works across a large number of people, then the cost of developing that process definition can also be spread across all the people. In some organizations, with some processes, this will work, but great care needs to be given to selecting the organization and process.

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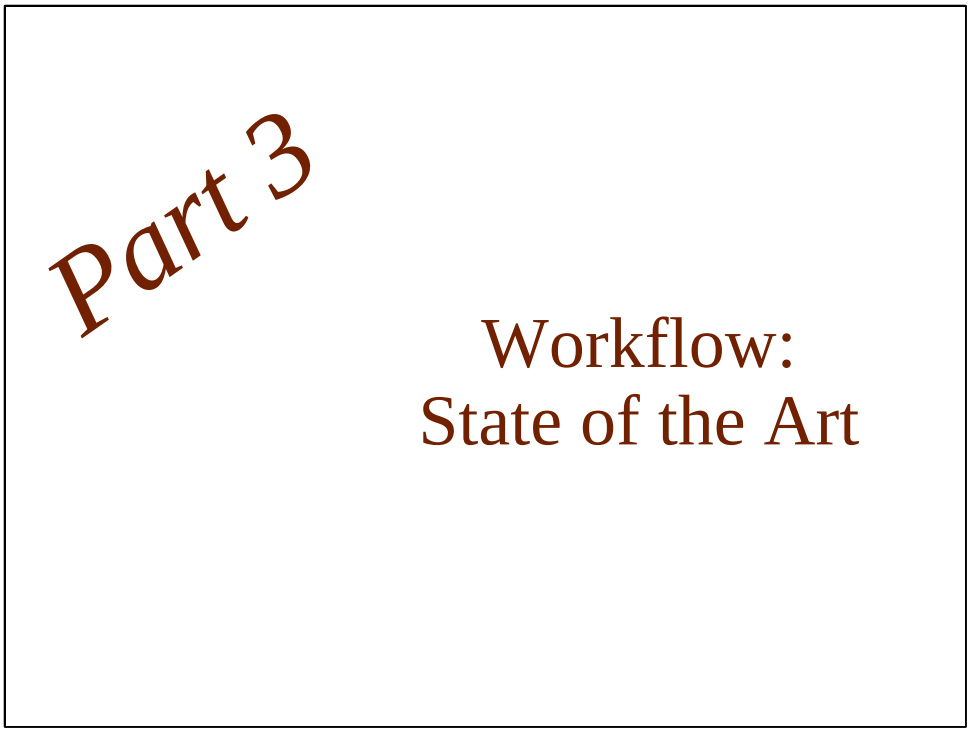


Part 3 covers the current capabilities of workflow

- Why is it different from document routing?
- What are the workflow origins?
- If process support is not new, what is new about workflow?
- What sorts of things can be automated with workflow?

What is Workflow Management

Automation of procedures or workflows where documents, information or tasks are passed from one participant to another in a way that is governed by rules or procedures.

» Workflow Management Coalition

Programs to coordinate worker's activities are not new. Large systems have been developed to support hospitals, customer support centers, and other custom vertical applications. In these systems the process rules are built into the application. The unique aspect of workflow systems comes from the separation of the process rules from the applications. This development mirrors that of database servers. In the 1980's database systems were developed so that data storage could be separated from the application program, with the resulting benefit that the same data could be easily shared by a number of different applications effectively integrating a suite of applications. The advantage of separating out the process rules from applications is that this will allow integration of numerous different applications into a single work process. A dedicated application to support all stages of a process is no longer sufficient in the face of all the extremely specialized tools that are available today. A business process might involve people in many different parts of the company, each of whom have application software specialized for the task they perform. The workflow must not replace these applications, but rather it must knit them together into a coordinated process.

Workflow Origins

- **Grew out of office automation, and paperless office movements in the 70's.**
- **Earliest implementation: Michael Zisman**
  - **PhD thesis, Wharton School, 1977**
- **Significant contribution: Clarence Ellis**
  - **"OfficeTalk" at Xerox PARC, around 1980**
- **Term "workflow" coined by industry**
  - **around 1984, possibly FileNet**

Workflow as it is today has been shaped more by trial and error in the marketplace than by the result of research on how work should be supported. Workflow can be seen as the logical outcome of the Office Automation movement which had significant academic support in the 1970's. Pioneering work by Zisman on SCOOP, Ellis & Nutt on OfficeTalk, and BDL from IBM, can be seen as laying the groundwork for what we now know as workflow.

Office automation lost momentum in the early 1980's, possibly because researchers began to realize how complex a social network the office environment really is. The day to day routines of the office are not as easy to formalize as they might seem. The term "workflow" was coined by industry. The first actual systems were developed and sold by companies that were primarily interested in promoting and selling document scanners, printers, and other computer equipment. Early workflow systems embodied simplistic assumptions about work habits, generally adopting a document centric view of the office. While simple in design, these systems fill a very large need for document routing and distribution.

3 Reasons for Popularity of Workflow

- **Relative Ubiquity of Networking Infrastructure**
- **Recession of Early 90's --> Downsizing**
- **Trend toward Process Orientation in Management**

If marketing material is anything to go by, workflow technology certainly promises a lot in the direction of automating the office. The dramatic popularity of workflow technology is grounded in the confluence of three separate factors.

First, the relative ubiquity of good networking infrastructure makes workflow possible from a technological point of view.

Second, the recession of the early 90's left managers desperately looking for ways to do more with fewer people.

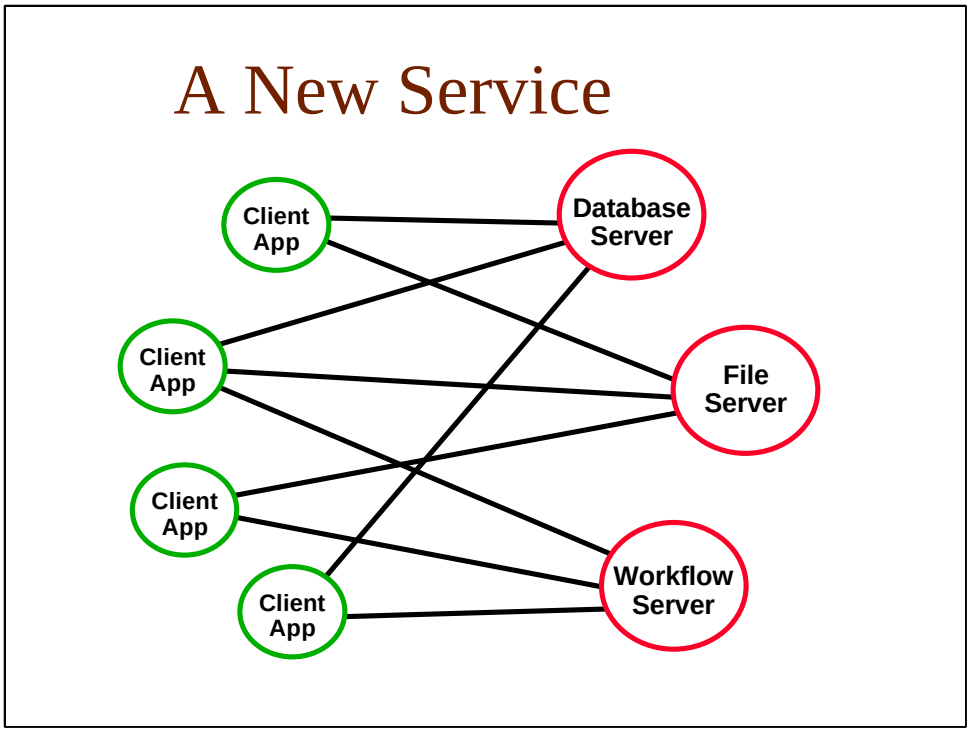
And third, the process orientation promoted for the most part by BPR. This last factor is the most dubious; many BPR professionals strongly believe that workflow is useful only for certain special cases.

Separation of Process Rules

- **1980's Database Technology**
  - **separation of the data storage from applications**
  - **allows applications to share data, to be "data integrated"**
  - **protectes data from changes and improvements in application**
- **1990's Workflow Technology**
  - **separation of process rules from the applications**
  - **allows applications to participate in workflow, to be "process integrated"**
  - **protects applications from changes and improvements in business processes**

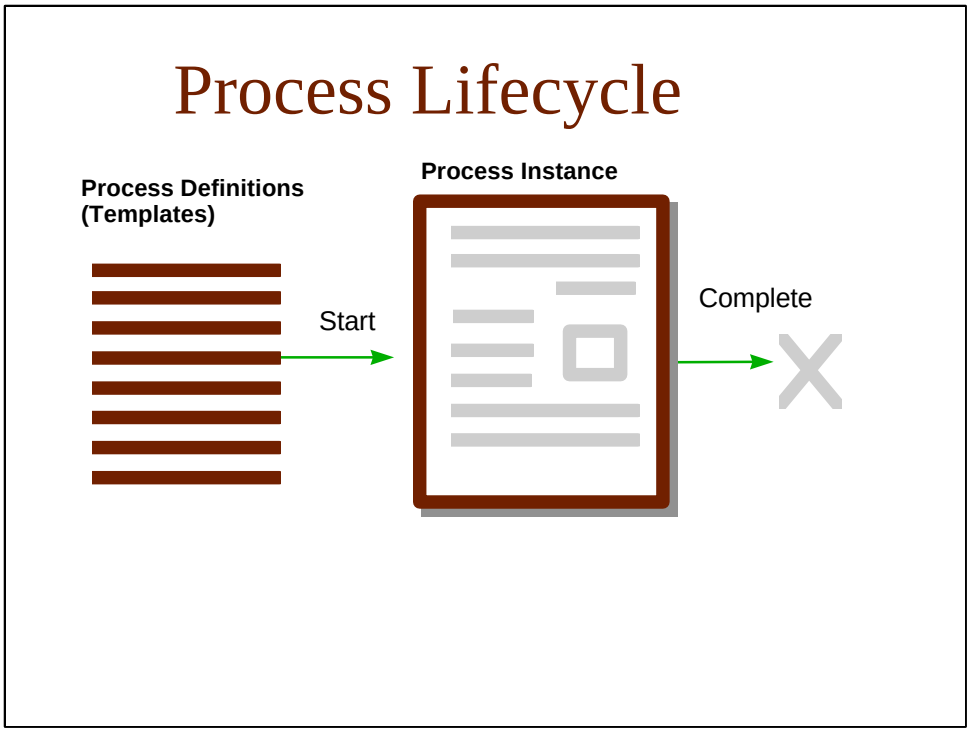
Process support capability is not new. Applications designed to support people coordinating different actions in different roles, such as hospital support systems, fast food sales systems, order fulfillment systems, reservations systems, etc., are not new. Traditionally, these applications have the process encoded directly into the application. All actions within the process must be performed in that application. In order to change the process, the application must be rewritten.

What is new about workflow technology is the separation of the process rules from the applications being used. More and more specialized software is being designed to support specific jobs. Certain processes involve many people from different specializations. For example, producing a market report may involve a number of people collecting information, a person to compose (write) the report, a person to edit it, a person to provide graphics for it, and finally another person to take care of production. While this is a single process, it is unreasonable to expect all of the people to use the same program. They already have tools specifically designed to support their activity, and these tools allow them to be most effective. Workflow is therefore needed to knit these applications together into a single process. None of the applications have the process rules themselves, but each can participate as part of a process.



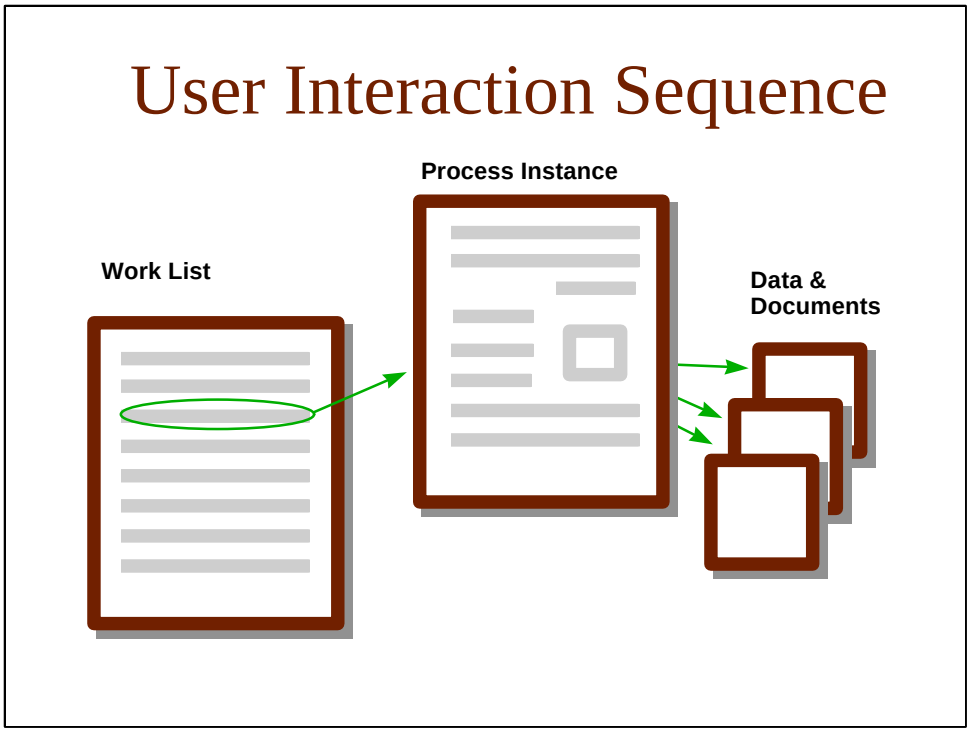
Workflow should be thought of as a new type of server that will be present in the office computing environment. File servers allow organizations to share files. Database servers go a bit further in allowing organizations to share (and control) information in a more structured and accessible form.

Workflow servers allow people to share processes. This means that they can participate in common processes. The applications that they use will be made "workflow aware" so that application can allow users to perform activities specified in a process.



The Process Definition Tool is used to create the process description in a computer processable form. This may be based on a formal process definition language, an object relationship model, or in simpler systems, a script or a set of routing commands to transfer information between participating users. The definition tool may be supplied as part of a specific workflow product or may be part of a business process analysis product, which has other components to handle analysis or modeling of business operations. In this latter case there must be a compatible interchange format to transfer the process definitions to and from the run-time workflow software.

The Workflow Enactment Software interprets the process description and controls the instantiation of processes and sequencing of activities, adding work items to the user work lists and invoking application tools as necessary. This is done through one or more cooperating workflow management engines, which manage the execution of individual instances of the various processes. The workflow enactment service maintains internal control data either centralized or distributed across a set of workflow engines; this workflow control data includes the internal state information associated with the various process and activity instances under execution, and may also include checkpointing and recovery/restart information used by the workflow engines to coordinate and recover from failure conditions.



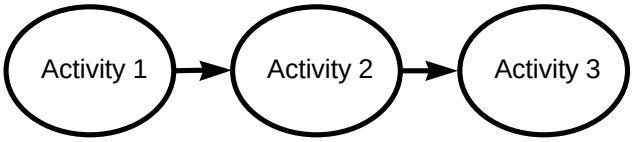
Where user interactions are necessary within the process execution, the workflow engine(s) place items on worklists for attention by the worklist handler, which manages the interactions with the workflow participants. The worklist handler is a software component which manages the interaction between workflow participants and the workflow enactment service. It is responsible for progressing work requiring user attention and interacts with the workflow enactment software via the worklist.

The workflow engines also include some form of application tool invocation capability to activate applications necessary to execute particular activities. The generality of such mechanisms may vary greatly, with some simple systems only offering support of a single fixed tool such as a form or document editor, whereas others may provide methods for the invocation of a wider range of tools, both local and remote to the Workflow engine.

Where process navigation decisions, or other control operations within the workflow engine, are based on data generated or updated by workflow application programs, such data is accessible to the workflow engine and termed workflow relevant data (also known as "case data"); this is the only type of application data accessible to the workflow engine. Workflow application data is manipulated directly (and only) by the invoked applications, although the workflow engines may be responsible for transferring such data between applications (if necessary), as different applications are invoked at different activity points within the workflow process.

Activity Orientation

- **Underlying model is that a process consists of a collection of activities.**
- **The activities are sequenced "somehow"**



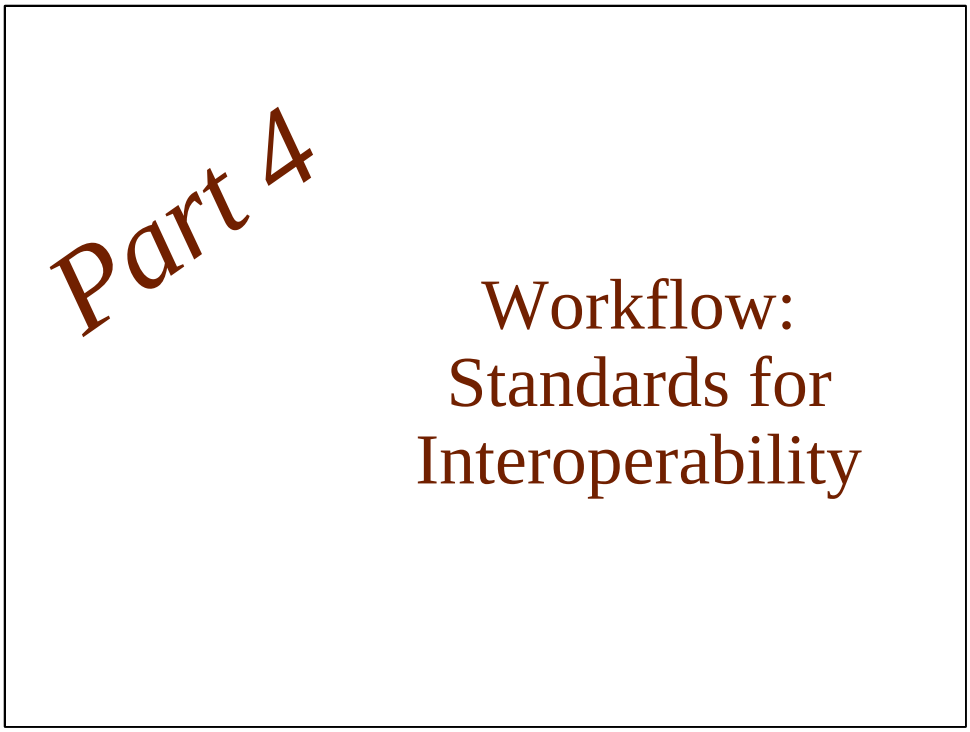
Document routing is a very limited special case of group communications. The lack of generality of these systems may have been the reason that so little serious research has been done on workflow systems. Recently there has been an increase in the research of workflow, while at the same time workflow products themselves have rapidly increased in capability.

Good Automation Candidates

- **If process involves a number of people**
- **If a large number of instances must be tracked**
- **If process lasts a long time**
- **If mistakes are expensive**
- **If people are located far from each other**

Not all processes are appropriate for workflow support. The best candidates for enacting by workflow are processes that are either copious, risky, or lengthy. A copious process is one for which there are a very large number of very similar instances active at the same time with respect to the number of people handling them, such as customer support or order fulfillment. A risky process is one where any deviation from the proscribed path is either very expensive or dangerous, such as legal processes, airline maintenance, or hazardous materials handling. For lengthy processes which extend over a very long time, the workflow system provides a sort of memory so that when the same or different people come back to the process after weeks or months they can be reminded of what has happened and what needs to happen.

Processes with any of these qualities are more likely to have a greater benefit than cost. The purchase price of the workflow system is only a small part of the total cost of implementing a process. The implementation cost comes mainly from the manpower needed to configure the system for the specific process, along with the cost of training the users. Implementation cost forms a barrier against the implementation of lower valued processes. It follows, therefore, that reduction in the cost and trouble of implementation will increase the number and variety of processes that can be supported with workflow.



Part 4 gives some technical details about workflow interoperability:

- How will workflow systems work together?
- Are organizations locked into a single vendor's workflow?
- How are applications to be used in workflow?
- How will process definitions be traded from BPR team to team?

The Workflow Management Coalition

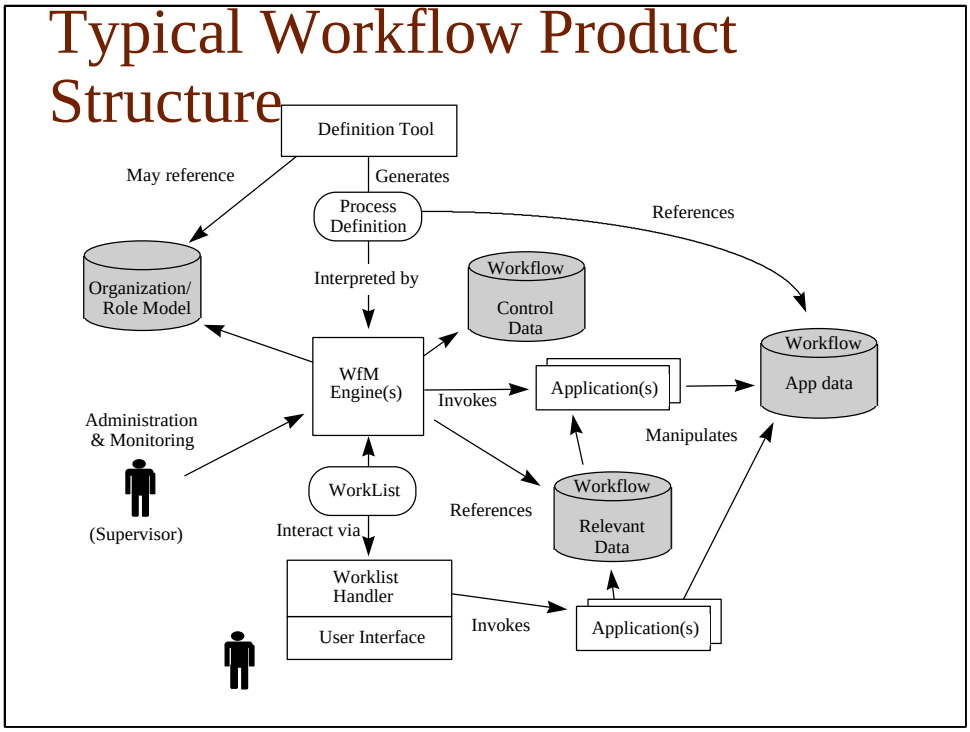
Founded in 1993, the Workflow Management Coalition is a non-profit, international organization of workflow vendors, users and analysts committed to the establishment of standards for workflow terminology, interoperability and connectivity.

The WfMC is a coalition of about 75 organizations for the purpose of developing standards for interaction between workflow systems and other software. The membership represents a good cross section of the workflow industry and a majority of the workflow products on the market. The first activity for the coalition is to develop a reference model and associated terminology to provide a framework in which to discuss the various specific implementations. In order for different workflow systems to operate together there must be a common understanding of the meaning of the parts of the system, and how to translate from one system in order to preserve these meanings. From the common features that workflow vendors agree are available across systems, we can learn quite a bit about the state of the art in workflow systems. For this reason we expand here on the WfMC reference model.

Goals of WfMC

- **Common API's to workflow services and functions for use by corporate developers, third party developers and other Workflow Management Coalition members**
- **Provide standards for interoperation between different workflow products**
- **Exchange business process definitions between different workflow models**

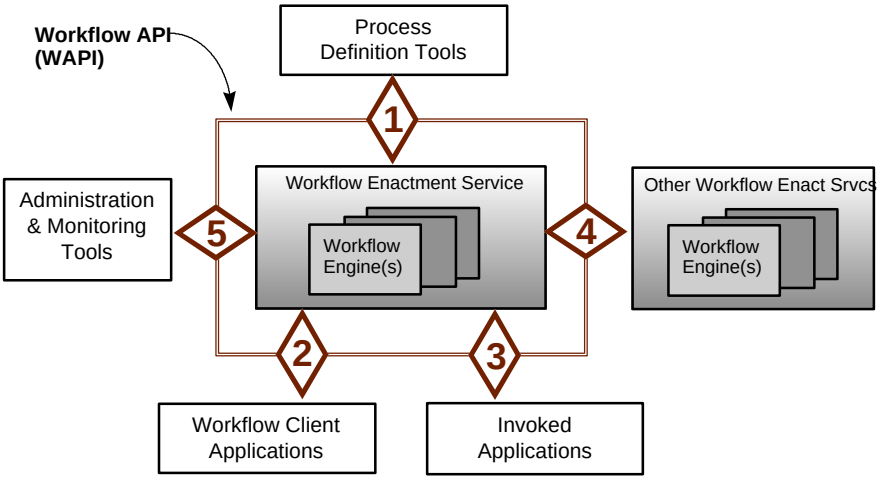
Members of the WfMC have come to agreement that the fundamental building blocks of a process are called “activities”. Roles are associated with activities, and people are associated with roles. The activities and roles together form process definitions. Processes are enacted by creating process instances. During the enactment, activities that are ready cause a work-list item to appear on an individual’s work-list. Generation of work-lists then becomes a fundamental aspect of workflow systems.



While workflow vendors seem to agree that completion of one activity causes the initiation of other activities, the exact mechanism by which this happens varies significantly from vendor to vendor. In many cases, the exact "process logic" mechanism is viewed as a key differentiator between systems, and thereby a key advantage of the system. Some systems allow only a single activity to be enabled at a time, thereby resembling a dataflow system. Others have no limitation on the number of simultaneous activities. While still others allow parallel routes if the data is split into separate packets at the point of divergence.

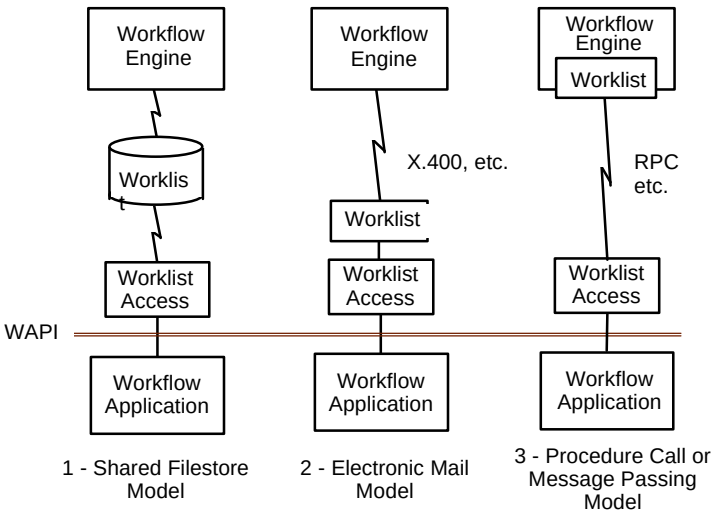
Some systems are like PERT charts with defined start/complete relationships between activities. In some systems activities are enabled whenever the right preconditions exist in the data. Other systems are like petri nets in that activities are enabled by the passing of a token. The way that people get mapped to roles also varies quite a lot from system to system. These differences cannot be reconciled at this time because the industry is immature, and there is no clear indication of which approach is best. Nevertheless, these systems can be made to interoperate in well defined ways.

Workflow Reference Model



Workflow systems are implemented on a wide variety of platforms and communications infrastructures. The key to operating together is a common interface through which information can be exchanged. The result will be that programs that are written to use this interface will be able to access information from any workflow system. Five different modes of interaction are identified with five primary interfaces.

Implementation Scenarios



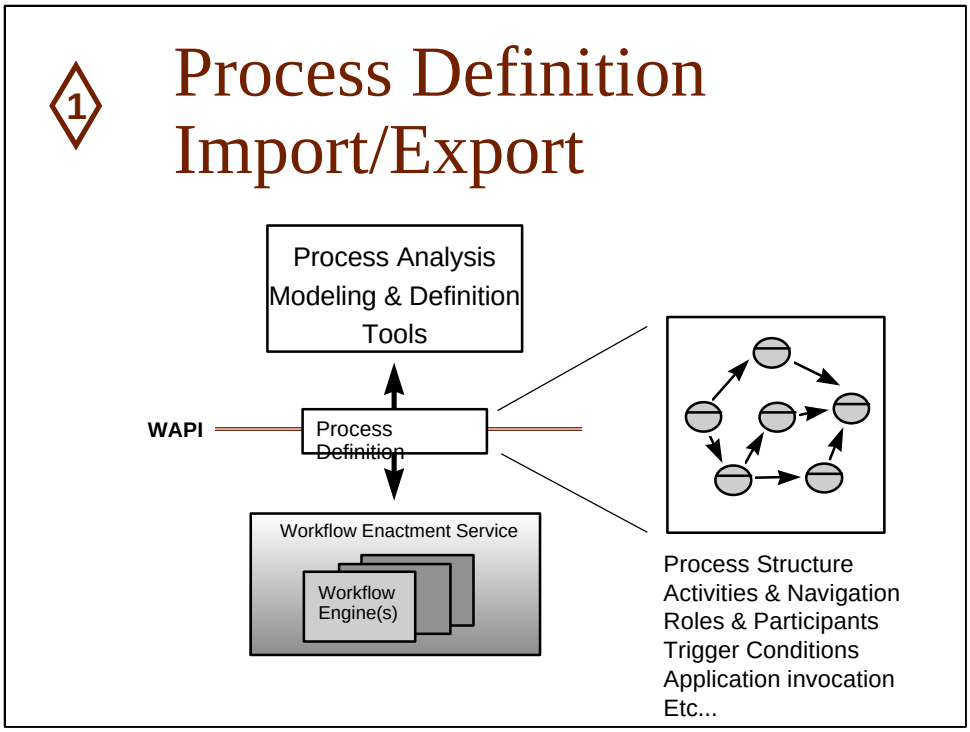
There are various possible product implementations of this worklist interaction model depending upon the nature of the product implementation and, in particular, on the type of infrastructure used to support the distribution of worklist handling. The four example scenarios are as follows:

* Host based Model - the client worklist handler application is host based and communicates with the worklist via a local interface at the workflow engine. In this case the user interface function may be driven via a terminal or a remote workstation.

* Shared filestore model - the worklist handler application is implemented as a client function and communication is via a shared filestore, which lies on the boundary between host and client platform environments and is accessible to both.

* Electronic mail model - communication is via electronic mail, which supports the distribution of work items to individual participants for local processing. In this scenario the worklist would normally lie at the client.

* Procedure Call or Message Passing model - communication is via procedure call, or other message passing mechanism. In this scenario the worklist may be physically located on the workflow engine or at the worklist handler according to the particular implementation characteristics.



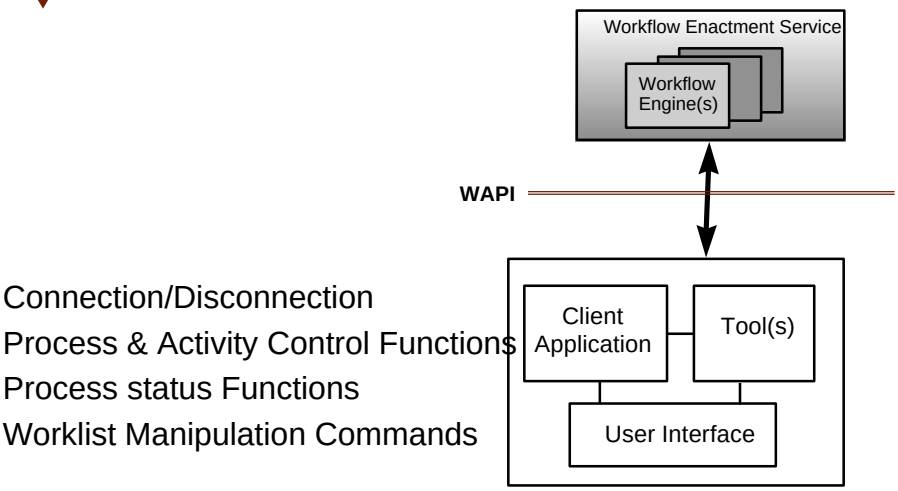
The interface between the modeling and definition tools and the runtime workflow manage-ment software is termed the Process Definition Import/Export interface. The nature of the interface is an interchange format and API calls, which can support the exchange of process definition information over a variety of physical or electronic interchange media. The interface may support the exchange of a complete process definition or a subset - for example a set of process definition changes or the attributes of a particular activity within the process definition.

There are two aspects to the Coalition's work in this area:

1. Derivation of a meta-model which can be used to express the objects, their relationships and attributes within a process definition, and which can form the basis for a set of interchange formats to exchange this in-formation between products

2. API calls (within the WAPI) between workflow systems or between a workflow system and process definition product, providing a common way to access workflow process definitions. Access may be read, read/write, or write only, and may manipulate the set of standard objects defined within the meta-model or a product-specific set (for example, defined in a product type register).

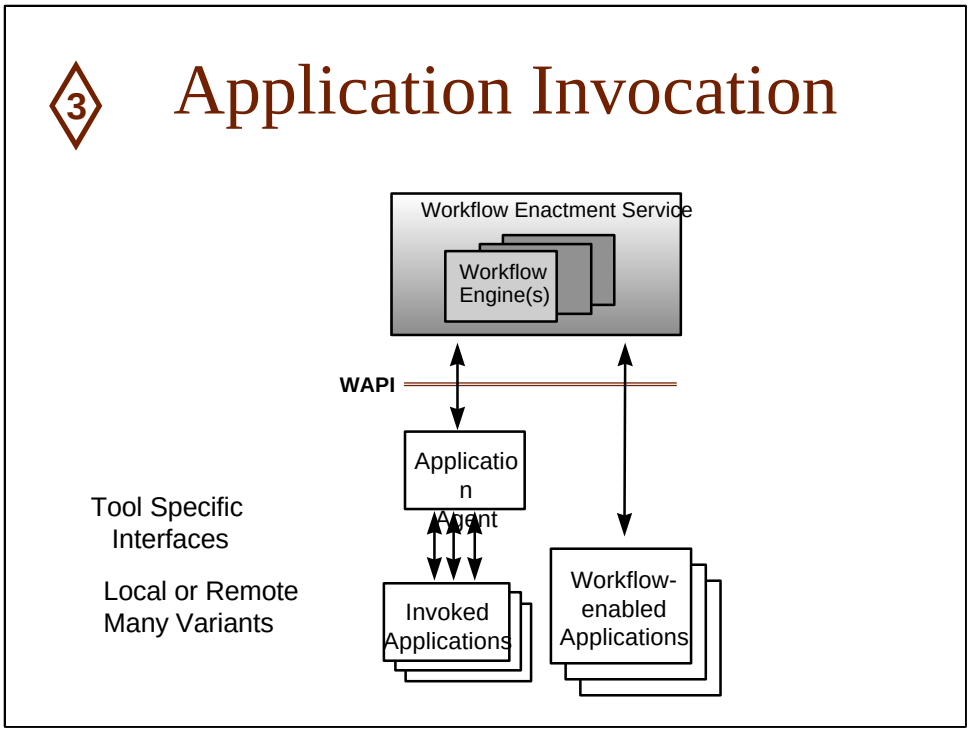
Client Apps Interface



Connection/Disconnection
Process & Activity Control Functions
Process status Functions
Worklist Manipulation Commands

Interface 2 provides general access for workflow enabled applications. The functions provided by interface 2 include session establishment, process starting and termination, actions on process instances, such as state changes, process instance status, worklist retrieval, retrieval / up-date of workflow relevant or application data, and administrative functions.

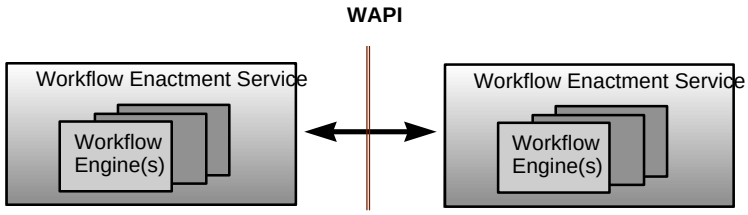
Application Invocation



Interface 3 provides a standard way for a WfM system to invoke an external application. It is intended to be applicable to application agents and (longer term) applications which have been designed to be "workflow enabled" (i.e., to interact directly with a workflow engine). In the simple case, application invocation is handled locally by a workflow engine, using information within the process definition to identify the nature of the activity, the type of application to be invoked and any data requirements.

The invoked application may be local to the workflow engine, co-resident on the same platform, or located on a separate, network accessible platform; the process definition contains sufficient application type and addressing information (specific to the needs of the workflow engine) to invoke the application. In this case the conventions for application naming and addressing are local between the process definition and the workflow engine.

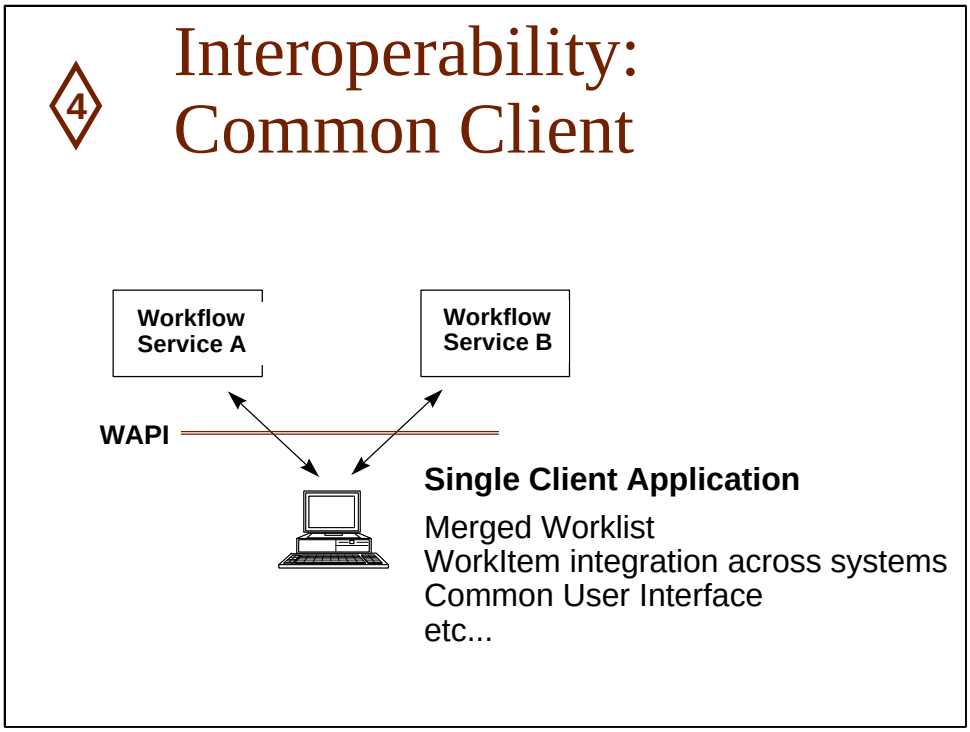
Interoperability: Workflow Service



Scenarios:

- Simple Gateway - inter-process connection
- Hierarchical - nested subprocesses
- Peer-to-Peer - fully shared process enactment
- Independent - with synchronization points

A key objective of the coalition is to define standards that will allow workflow systems produced by different vendors to pass work items seamlessly between one another. This is the job of interface 4.

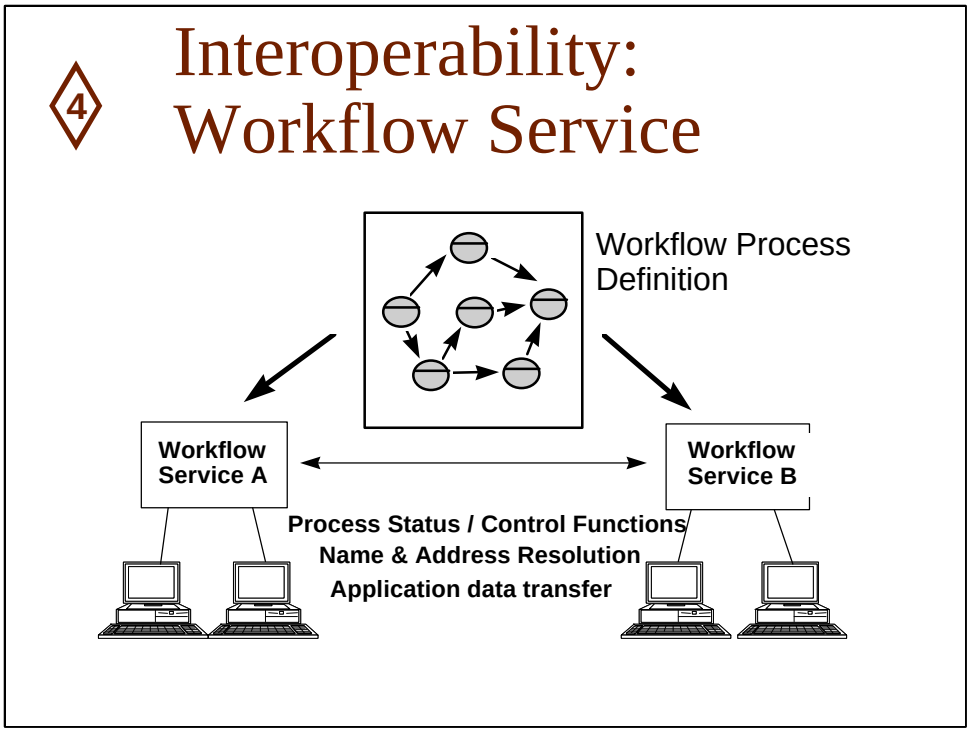


Client:

Workflow products are diverse in nature ranging from those used for more ad-hoc routing of tasks or data to those aimed at highly regularized production processes. The work of the Coalition has therefore focused on developing a variety of interoperability scenarios which can operate at a number of levels, from simple task passing to full workflow application interoperability with complete interchange of process definition, workflow relevant data and a common look and feel. In this area it is expected that relatively simple interoperability scenarios will be supported initially, with the more complex situations requiring further work on interoperability definitions. Four possible interoperability models has been identified, covering various (and increasing) levels of capability.

Server:

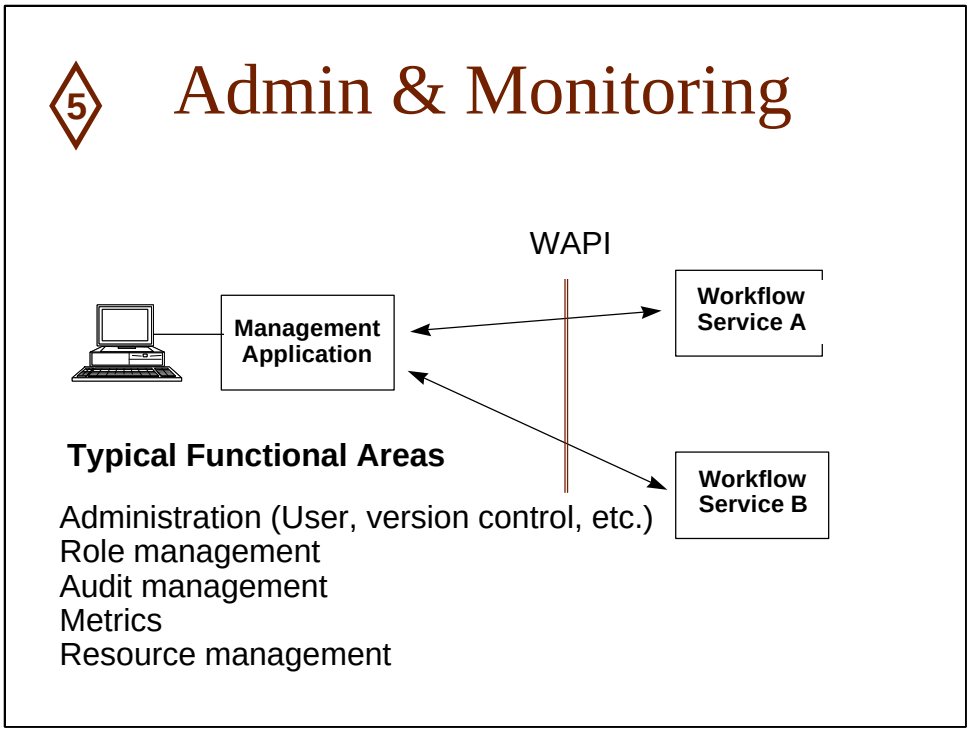
The Connected Discrete (Chained) Scenario allows a connection point in one process to connect to another point in another process. It is useful to think of these connection points as being the terminus and starting points of the processes, but for full generality it is presumed that the connection points can be anywhere within the processes. This model supports the transfer of a single item of work (a process instance or activity) between the two workflow environments.



The Hierarchical Scenario allows a process executed in a particular workflow domain to be completely encapsulated as a single task within a (superior) process executed in a different workflow domain. A hierarchic relationship exists between the superior process and the encapsulated process, which in effect forms a sub-process of the superior. The hierarchic relationship may be continued across several levels, forming a set of nested sub-processes. Recursion within this scenario may, or may not, be permitted by individual product implementations.

The Connected Indiscrete (Peer-to-Peer) Scenario allows a fully mixed environment; for example one process might include activities which may be executed across multiple workflow services, forming a shared domain. In this scenario, the process would progress transparently from task to task, without any specific actions by users or administrators, with interactions between the individual workflow engines taking place as necessary.

The Parallel Synchronized Scenario allows two processes to operate essentially independently, possibly across separate enactment services, but requires that synchronization points exist between the two processes. Synchronization requires that once the processes each reach a predefined point within their respective execution sequences, a common event is generated. This type of mechanism may be used to facilitate functions such as process scheduling across parallel execution threads, checkpointing of recovery data or the transfer of workflow relevant data between different process instances.



Interface 5 defines a common interface standard for administration and monitoring functions which will allow one vendor's management ap-plication to work with another's engine(s). This will provide a common interface which enables several workflow services to share a range of common administration and system monitoring functions.

Process Interchange

MIT Center for Coordination Science is developing a standard Process Interchange Format (PIF) to:

- **Allow BPR teams to express plans in a way independent of specific workflow.**
- **Allow plans developed for one workflow system to be moved to another.**
- **Allow specilzed process analysis tools to be linked to real workflow systems.**

This is possibly the most difficult part of workflow interoperability. While workflow systems may standardize on the representation of processes being based on activities, the exact mechanism by which those activities are sequenced is still quite varied. Due to the inherent complexities of representing work, it is difficult to come up with a common format.

Yet this group is developing such a format which is based on "knowledge representation". This has the ability to represent very sophisticated process structures as well as rules associated with them. Chances are, this PIF will become at least one of the options for moving process definitions from one system to another.

Portable process definitions are very impotant for the BPR professional. This will allow the compilation of a "process handbook" that will contain starting points for BPR teams. These process definition can then be customized for the particular organizations.

An interchange format will also be quite important to allow different teams in an organization to share process definition, even when they have different workflow systems.

Finally, specialized BPR tools will need PIF in order to integrate with an existing workflow system.

References From Part 4

- **Workflow Management Coalition**
  - **Avenue M. Thiry 204**
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  - **100113.1555@compuserve.com**
  - **http://www.aiai.ed.ac.uk/WfMC/**
- **WfMC Glossary**
- **WfMC Reference Architecture (to be published)**
- **Center for Coordination Science (MIT), Process Handbook Project**
  - **http://www-sloan.mit.edu/CCS/CCSMain.html**

The Workflow Management Coalition is moving forward on providing a reference model architecture to serve as a framework for comparing and integrating systems from different vendors. Fujitsu is an active participant in this coalition with the aim that Regatta Technology, Fujitsu's workflow offering, can interoperate with other systems, regardless of the vendor. This is the goal of the coalition, and one that should be very welcome to end users. Those evaluating workflow systems should ask the vendor whether the system is "open" by supporting these common interfaces and models. Such a system has a far higher chance of being extended and customized in the future.

Thomas W Malone, Kevin Crowston, Jintae Lee, Brian Pentland, "Tools for Inventing Organizations: Toward a Handbook of Organizational Processes", Proceedings of the 2nd WET-ICE, IEEE Press, 1993

"Process Interchange Format" - to be published soon by the authors above.

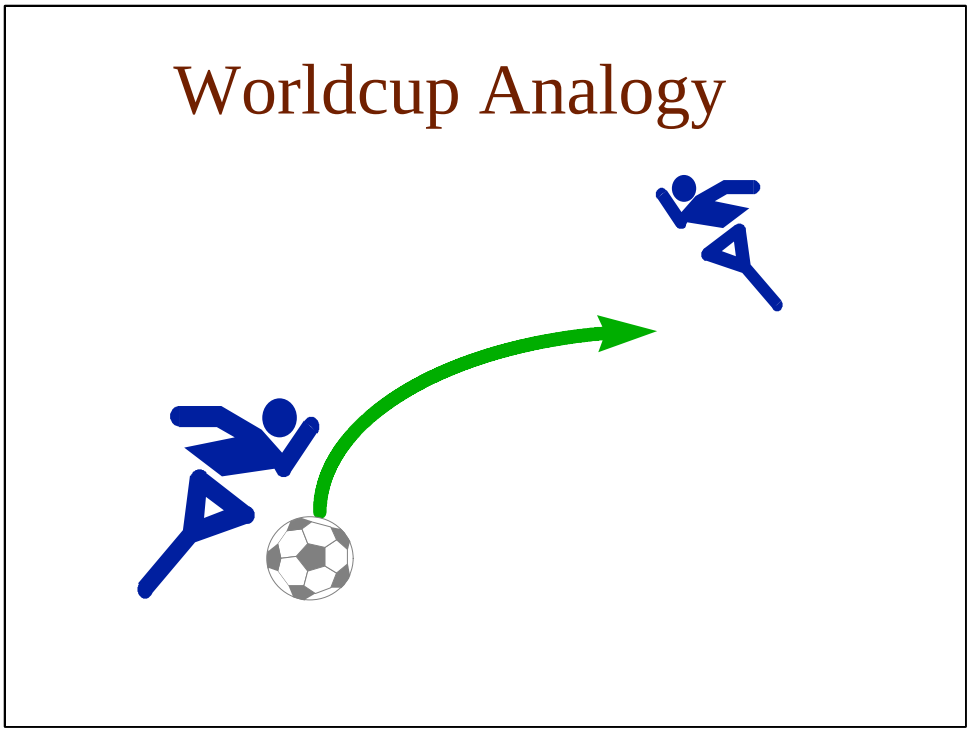
Part 5

Application of Workflow to BPR

Part 5 covers the “fit” between workflow and BPR:

Since the workflow industry did not anticipate BPR, it is reasonable to ask the question: “Can workflow support the BPR activity, and what must be improved to improve this support?”

- How can the results of BPR be coded into workflow?
- What are the limitations inherent in workflow?
- What are the politics of workflow?
- How is TQM effected by workflow?



OMIT THIS SLIDE FROM HANDOUT

The best way to explain this is by using an analogy.

Consider that instead of automating a work process for an office full of workers, we were to automate the activities of team of soccer players. To an untrained eye, the game of soccer is simply a matter of passing the ball from person to person and getting it into the goal without losing posession of it. We might choose to model the situation in a computer system as an electronic equivalent of a soccer ball that is made available to a person who then forwards it to another person electronically.

The pitfall with this model is that it completely ignores the fact that for a player to receive the ball, he must be at the right place at the right time. The reality is that all players are playing continuously, regardless of whether they have the ball. The difference between winning and losing depends more on the way that the team communicates and anticipates each others actions, than it does on the skill of the person currently dribbling the ball. It is the same way in the office. Traditional document routing workflow is a gross simplification of what is really happening to get work done.

It is important to go beyond simply moving documents from worker to worker; people need to know and understand what others in their office are doing, so that they can anticipate and prepare for future activities.

Intangibles

- **Office work consists of tangibles and intangibles.**
- **By focusing only on tangibles, one might miss important aspects of what is really happening.**
- **Intangibles may not be readily apparent.**

Software applications typically concentrate on producing results which are tangible. For example word processors produce documents as an outcome. Spreadsheets produce financial reports. Presentation programs produce slides. Games produce visual images and modes of entertaining interaction.

Software to support the production of a tangible object is fairly straight-forward. We all agree what a document looks like.

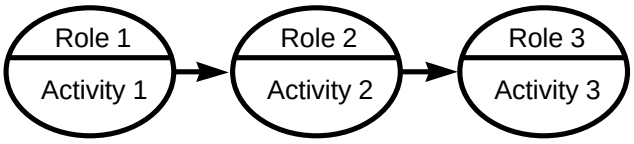
Coordination, on the other hand, is not a tangible result, in the same way that "teamwork" is such an undefinable quality. Different teams can and do operate in wildly different modes of coordination. People naturally adjust their mode of coordinating to match each person they interact with. We are largely unaware of how this happens.

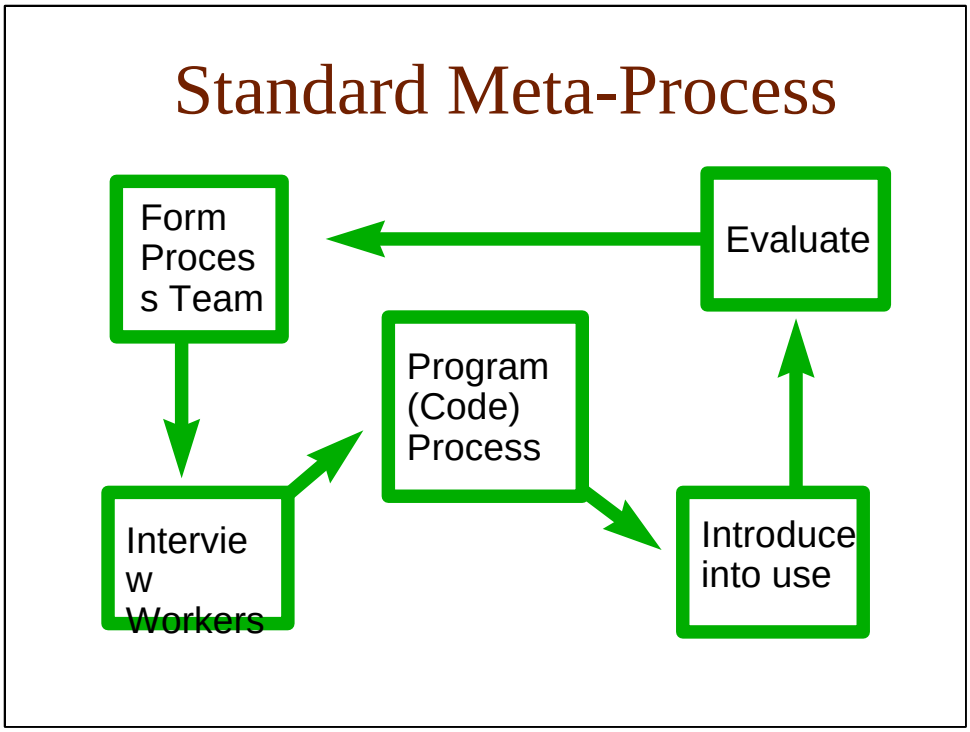
Workflow technology has the daunting task of encoding intangible patterns of communication into a system to support it. This is a source of great difficulty, and is also the reason for the extremely wide variety of approaches available in the marketplace.

Conclusion 1

Workflow software that focusses on Documents might not support all kinds of work.

Focus on Activities instead.





There was $1 billion worth of Business Process Reengineering consulting in the US in 1993; all of it consisted of implementing in one form or another this meta-process.

Thomas Davenport claims it takes two years to go through this cycle. We believe that with proper technology, the cycle could be reduced to six months, but even then you are always six months out of date. The organization is locked into processes, and cannot respond to external pressures quickly and effectively.

This is still the best way to develop processes, but it is fundamentally flawed because of the “interview” step. Workers are rarely able to express how they do their work.

Fixed in Stone

- **Implementation of a process in a workflow system may have the effect of "fixing" the process in a certain version.**
- **If a programmer is required to change the process, the cost of change may be too high, thereby preventing change.**

The biggest single drawback of implementing a process in a workflow system is that the process is fixed. If the needs of the organization change, then you are faced with a cost to modify the workflow implementation to match the new requirements. It has been pointed out that business goals are moving targets, and there is every reason to believe that this will be increasingly more so in the future. Most workflow systems are designed to support static process descriptions; some even require recompiling of the server in order to make a change in the process.

BPR at its fundamental level means change. Thomas Davenport points out that process improvement and process innovation go hand in hand. The job of the BPR team is in a certain sense never done, and should instead be looked upon as a continual effort of evaluating the success of the last improvements and looking for new areas to improve. If workflow is to truly support BPR, then it must support this aspect of continual improvement of the implemented processes. Once again, the cost/benefit issue enters the picture. If the cost and trouble of making a small change to the process is more than the benefit from that small change, then the organization will be stuck with a process as it goes out of date.

BPR needs Plans - Not Programs

- **Trend toward plans which describe a particular instance of a process.**
- **Plans can account for the specific situation.**
- **Plans are expressions, like documents, and are used to explain the process to others.**
- **Plans can be created and modified by regular office workers.**

Because BPR is collaborative, all BPR team members must work together on a plan to come to agreement on the best plan. A BPR tool should support the display of plans in a format that can be created, edited, and understood by non-technical people.

Conclusion 2

Situated Processes need flexibility to change the process.

Workflow that does not have this ability to continually change process plans might not be able to support situated processes.

One way to improve the return on investment for workflow implementation is to share the cost of implementation across a large organization or a number of organizations. This can come about either by a central authority implementing a common process and making it available to all, or by means of a market where process implementations are bought, sold or traded. There is at least one university project devoted to developing a handbook of common processes to serve as starting points which remove a great deal of the implementation cost.[8]

Yet there is a hidden danger that BPR practitioners should be wary of. Different people and different groups often accomplish the same goal through very different processes. This should not be viewed as a failure of the organization to be uniform, but rather a success in allowing the various parts to optimize their own activities. A central authority which imposes a single process across a large organization may at the same time destroy the organization's ability to fine tune team behavior.

One of the advantages of BPR is that the methodology works at every level. Clearly the big wins are found most easily at the company-wide level, but the principles work just as well in the small team for re-engineering processes. But this property of scaling is not the same in workflow technology because the mechanical nature of the implementation can be much more rigid than a manual system. Those that gamble on the payback of an expensive implementation through widespread adoption should remember that a system designed for the average team may result in being usable by no team.

Situated Tennis

- **Doubles Tennis is not just tennis with two people on each side of the net.**
- **The number of players changes the game and strategy in fundamental ways.**
- **The exact strategy depends upon who the players are.**
- **Work must be planned “in the situation”.**

A process for a small project may not work for a large process, and vice versa. The process is inherently dependent upon the size of the team.

Conclusion 3

Processes need to be individualized.

Workflow that constrains the entire organization to the same process plan might not allow teams to work optimally.

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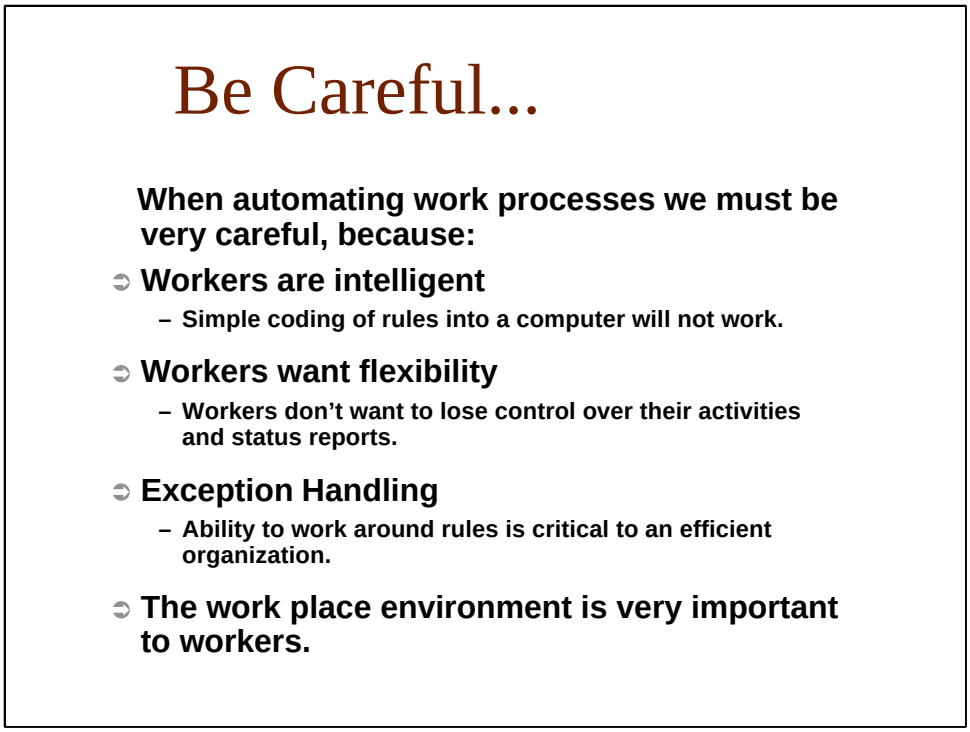
Politics of Workflow

- **Why is everyone talking about defining someone else's job?**
- **Control of process definition means control of others.**
- **Who will hold this power?**

If the workflow does support change, the next question is "Who is allowed to change the processes?" Can the BPR team change them directly, or must they submit to some other authority in order to change them? Can anyone in the BPR team make a change, or just the leader?

The ability to grant and deny the ability to change a process will form a new kind of social power. Some organizations will reserve this capability for a certain individual or group, such as MIS. Others will give this privilege to certain levels, such as managers. Others will recognize that each process instance has certain process owners who will have the ability to modify processes on a case by case basis. These decisions should be made by the members of the organization, and not by the workflow technology provider.

Like any groupware, workflow must take into consideration many social factors. The office environment is more complex than it seems. Many interactions happen at an unconscious level or in a natural way that belies their importance. Introduction of new technology into a social setting is a veritable minefield until the users and technology adapt to each other, assuming that they are able to adapt.



We are social animals. Working in groups comes as naturally to us as speaking does. This naturalness leads us to believe that it will be easy to automate coordination, but it is precisely this naturalness that blinds us to the difficulties. Computer recognition of speech is still unsolved.

Failures at automating office work may arise from the attempt to literally implement the rules of the office. Staff in an office work under the assumption that there are a set of rules that they are following. While the rules exist, the workers have a great deal of flexibility in implementing them. It is the intelligence behind the use of the rules that allows them to work. Upon close examination studies[15] have found mutually contradictory office rules; yet the office still functions on the judicious application of these rules. Blind coding of the office rules into a computer that lacks the common sense of the workers may yield disastrous results.

A good example is the Kanban system of inventory control cards. In this system the set of rules is very simple, but because people were the carriers of the cards they could make value judgements about which cards were urgent, and which cards could be "pocketed" and delivered later. This prioritization made the system operate more smoothly and efficiently than if the system were implemented literally on a computer system.

A key point to keep in mind is that office workers currently enjoy a great deal of flexibility in how they implement office procedures. This flexibility may account for a large part of the effectiveness of each worker. It is critical that any replacement system allow for the same degree of flexibility and empowerment.

Keep Workers Involved

- **"Technological design embodies assumptions that can either invite or extinguish a human contribution"**
- **"There is a need to create organizational environments that support the quality of effort and the kinds of relationships in which intellective competence can be demonstrated."**
  - **Shoshanna Zuboff, 1988**

While reengineering business processes it is important to remember avoid de-skilling the worker, but rather to use the skill that people are uniquely qualified to perform. Instead, efforts should be made to provide a communications infrastructure that allows people to know what each other is doing, what is expected of each other, and what the results of the work have been.

Conclusion 4

Workflow can change the balance of power in an organization.

Workflow that is centrally controlled might only be suitable for a very centralized organization.

BPR teams should be composed of experts in the area being re-engineered, especially broad representation from the people involved in the task on a daily basis; only they can know the subtle details that make the difference. The same might be true for implementing the process on workflow, but this may not be possible if the workflow system requires special technical expertise to perform the implementation. If a programmer is required to make a change to the implemented process, then an extra person must be involved in every change, no matter how small, raising again the cost of the change, and forming a barrier against small incremental improvements in the process. In order to accommodate this, most workflow systems are implementing graphical process descriptions so that end users can modify the process description directly without involving a programmer. There is still more capability needed in this area.

Distortion of Process

- **Since the workflow process definition is an expression of an intangible, it is only natural that it will not represent it perfectly.**

Conclusion 5

- **The BPR team will need to choose a workflow tool that represents processes in a way that is natural to them.**

The BPR community knows well that there is a difference between a process and a workflow process. The WfMC went to a lot of trouble to define different terms for process, workflow process, and manual process. Not everything can be supported by the workflow system.

If the goal of the BPR team is to produce a workflow implementation, then they have two tasks: first to find the optimal process, and second to encode that process in the workflow system. Every workflow system has limitations to expressibility. Different systems work better in different situations, but all systems require that the process be coded in ways particular to that system. The workflow system will embody a close approximation of the optimal process, but never the exact process. There is always some distortion of the process due to the representation.

Some workflow systems require the process to be described in terms of documents flowing from person to person; in fact it was this orientation that lead to the name "workflow". A data flow orientation might be useful for implementing traditional formal processes, but it will be quite limiting for the BPR team. If documents flow from location to location, then this means that the document has a location; a user either has the document or does not have it. The very purpose of BPR is to redesign work processes to make use of the new capabilities provided by IT, the most important being the location independence of information. Most BPR teams will find no sense in using a workflow system that re-establishes location dependence of information.

Find the Right Match

Organizational Quality	Relatively less sensitive to...
Quiescence	Cost of change of process
Coherence	Cost of change of process
Autocratic	Centralized Control

Different organizations need different kinds of workflow. We have determined that there are three qualities of an organization that should be considered when choosing workflow software.

1. Quiescence: Is the organization turbulent or not? Does it adapt to new situations readily. Or is it fixed in it's ways and the ways never (need to) change. If the organization is quiescent, it will be relatively insensitive to the cost of changing a process.

2. Coherence: Is the organization the same across all divisions, or do different divisions operate in very different ways? If it is coherent, then it can benefit by splitting the costs of developing a process across many divisions.

3. Autocratic: The exact term for this has not been found. Some organizations work on a very autocratic basis through a very centralized command and control. These kinds of organizations will be less sensitive to the centralization of control required by some workflow systems, than would a company that is more distributed in the way that it works.

There are no absolute measures of these dimensions, but those considering adoption of workflow should be aware that different workflow packages and different organizations can be compared along these three axes. The workflow system should be matched to the organization.

Part 6

The Future of Workflow: A Tool Designed for BPR

Part 6 covers the future of workflow aspeccts specifically designed to support BPR:

- How can the BPR process itself be supported?
- What features are needed to support BPR collaboration?
- What is Collaborative Planning?
- How can individualization be supported?
- How can continual change be handled?
- What are the benefits and payback of this new technology?

Collaborative Planning

- **BPR is essentially planning, but it involves a team to collaborate to find the best process.**
- **Workflow is good for enacting plans, but has little support for the planning activity itself.**

Therefore:

- **We call the tool that should support the BPR activity itself a “Collaborative Planning” tool**

Planning is used here to mean the activity of constructing plans of action for coordinating future work. There exists two sorts of plans: plan instances and plan templates.

We use the term "plan instance," or more loosely just "plan," to denote a specific plan for a process which has begun enactment. It involves specific people and organizations, and includes details of the situation. The plan to satisfy a particular customer with a specific order is a plan instance.

We use the term "plan template" to refer to a plan that is prepared in advance to anticipate a kind of situation before the details of the actual instance is known. For example, an emergency evacuation plan is prepared in advance of any real emergency so that when it is needed it can be instantiated quickly. It serves as a starting point for the specific plan.

What is CP?

Collaborative Planning is concerned not with the process definitions, but rather the process by which those definitions are created.

The process plan is a description of the notable activities to complete a goal. The creating of the plan is the planning activity, a sort of meta-work. A plethora of tools are available that help support the work activities themselves through the use of plans of one form or another. What is of concern for collaborative (CP) is how the plans themselves are created. For most systems the activity of plan creation is outside of the system itself, something to be done at a different time (before), and usually by a different person (a programmer), than those involved in the work. A CP tool should have features to support the planning activity, including the interactions between people that necessarily take place during the creation and evolution of plans.

It is our belief that the large number of process support and workflow systems will soon realize the limitations inherent in the separation of planner and worker, and will evolve to have collaborative planning capabilities. Indeed there are already several multi-user project managements tool that incorporate some CP requirements. Our goal is to identify the common features that all such systems will need in order to be successful, and subsequently some of the inherent drawbacks.

Sharing in Planning

- **Planning is a run-time activity of drawing up a process description.**
- **Planning must not require a programmer.**
- **Many people can be involved at same-time or at different times.**

Most project management tools assume that the planning activity happens elsewhere. You can imagine a conference rom full of the key stakeholders to achieve a particular goal; they discuss what, how, and when things will be done. They make some agreements. Then, one of the people in that meeting brings up the project management tool and enters in the results of the discussions. Futher tuning of the plan is done in later meetings, with the results used to update the plan.

The concept behind collaborative planning is that what takes place within the meeting should be supported by the tool.

Control of Planning

But the change must be controlled, so:

- **Process Definition must be fragmented so that different users can have different rights for different parts of the process.**

Allowing a group of people to make changes is only the beginning of the solution. Just as soon as anyone can change, you find that there are situations where change must be prevented.

For example, if a person is responsible for achieving a particular result, then that person must be assured that someone unrelated to the goal can not come and change the process. While it isimportant that the person who owns the responibility for a result aslo have the authority to set the process, it is conversly true that those who do not hold any responsibility may need to be excluded from changing the process.

An analogy can easily be drawn to file systems. The DOS file system has no user rights control. If you have any access to the file system, you have full access to all file. More advanced file systems such as Novell, Unix, and many others, give specific right for specific users to specific files.

The same sort of rights and control is needed for workflow processes, to assure that the right people can collaborate on some processes, while different groups have different rights on different processes.

Planning in the Situation

- **Ability to add activities on the fly means that the plan does not have to be complete from the start.**
- **Planners can wait until they are "in the middle of the process" to add activities for the particular situation.**
- **All possible exceptions do not need to be accounted for in advance.**
- **Activities are situated in the context of the plan and need only enough details to make sense in that situation.**

A CP tool is radically different from other process support tools because the process does not need to be predefined by someone outside the process, and then introduced to the entire organization en masse. By making it easy to create and try plans, users are encouraged to refine and maintain their own segment of the organization.

Collaborative Planning allows groups to automate by themselves if they will benefit, or to operate manually if they will not benefit from automation. Only those processes that make sense to automate will be automated.

This sounds obvious, but when required to define a process completely before using it, it is not always clear which parts should be automated, and which are a waste of time. Work processes often involve tacit knowledge: tasks learned by trial and error that have never been expressed externally in a written or verbal form. It is unreasonable to expect workers (who are not experts on group processes) to be able to describe tasks--even those tasks done routinely every day--accurately enough for an independent process programmer to implement. A CP Tool's design-as-you-go approach allows users to make requests as they need them. Then, after completion, one can go back and see what was really done, how effective it was, and how to make it better next time. This is process improvement.

Support of Individualization

- **Planners must be able to paste pre-defined pieces into the plan.**
- **Different groups must be able to have different versions of the same piece of a process.**
- **Different instances may need different versions of the pieces, depending upon the situation.**

A collaborative planning tool is designed to be used by end users. It needs to be easy enough to use without a lot of specialized training. An analogous situation is the production of financial reports compared to the introduction of spreadsheets. Spreadsheets did not enable any capabilities that were not already available to those willing to hire a programmer. What the spreadsheet offered was a way for end users to create reports and calculations without having to program.

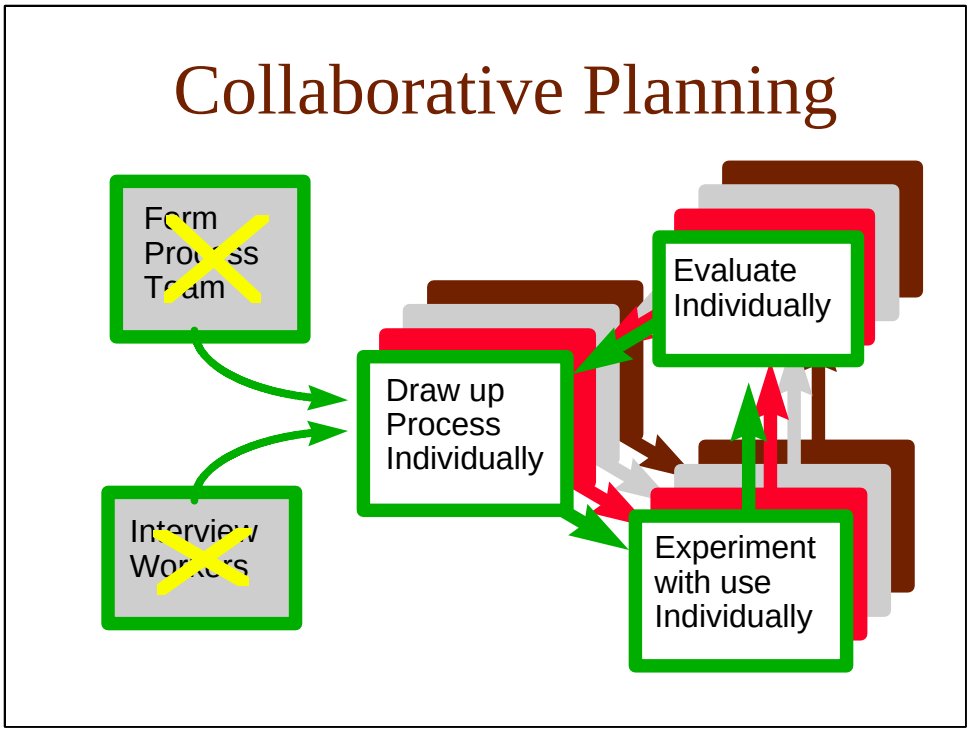
Since groups work in differing manners, a collaborative planning tool must support a way for each group or individual to specify their own versions of plan templates which are optimized for their group.

The CP tool must allow changes to the plans after the process has started. While this may appear initially to be an implementation issue, we believe that without the ability to change process plans on the fly, the end user is burdened with having to produce very complete, very formal process plan templates, or to turn to specialists to assure completeness, which would interfere with the collaborative aspect of the tool.

Process Capture

- **Individuals (or small groups) try out processes.**
- **They change only the part of the process they own.**
- **No distinction between user mode and planning mode.**
- **If the process is incomplete or wrong, changes can be made immediately - in effect learning.**
- **The quality of the process increases until it is satisfactory.**
- **No need to know how the process works from the beginning, like the way people learn their job.**

A CP tool can be a help when the process is unknown, but the workers know what to do. By adding to the process as it happens one can end up with a record of what happened, as well as a preliminary template for the next time. March and Simon point out that definition of new processes is one of the most important activities of any organization.



This is the proposed meta-process for a Collaborative Planning tool. The process team implements that process directly. Interviewing the workers is not a separate step, but it is integrated into the activity of creating the process. This avoid a tremendous amount of up-front expense.

Instead, design the system to be easy enough for end users to use and to design their processes as they work. If the process is not correct (it never is the first time), they need the ability to correct it on the fly. They can evaluate individually whether it works correctly, and change it for the next time. In tests of Regatta, we have found that in a matters of days processes can be improved a substantial degree.

A CP tool will allow the process to be broken into pieces owned by different people. Some people can be modifying their process while others who have satisfactory processes are not disturbed. Different groups can have different processes for the same goal; allowing experimentation without requiring the whole organization to be involved in the experiments. Once a good plan has been found it can be distributed and traded like a document.

CP Decentralizes

- **Rather than centralized creation and control of process definitions, CP gives this capability out to smaller groups, even individuals.**
- **Users have control over their own processes.**
- **Improvements can be made on the spot, without having to get buy-in or sign-off from the entire organization.**

It is easy for people to test new ideas. If the plan is determined to be faulty, the ability to modify plans on the fly allows for recovery. The built-in documentation of the process helps others to keep informed when they experience a process step they are unfamiliar with, or to learn a process in the first place. Through experimentation in live situations people may come across solutions that are not apparent in a more abstract situation. Since different teams are allowed to have different plans for the same situation, plans that are optimal for each particular team can be found.

A CP tool has an advantage over a traditional planning tool in that the single user bottle neck is avoided. Each individual or group is responsible for keeping their own plans up to date, effectively distributing this activity away from a central control out into the work force closer to where the work is being done.

The plan fragment templates allow complete plans to be constructed quickly and automatically. The complete plan is customized for the groups that are involved in this process instance.

Less Investment before Payback

- **How many people and how long does it take to develop a workflow process?**
- **What if it is wrong? How quickly can it be changed?**
- **Will you be able to respond to external changes. Will a workflow system hold your company back?**
- **The biggest barriers to workflow use: Cost & Risk.**

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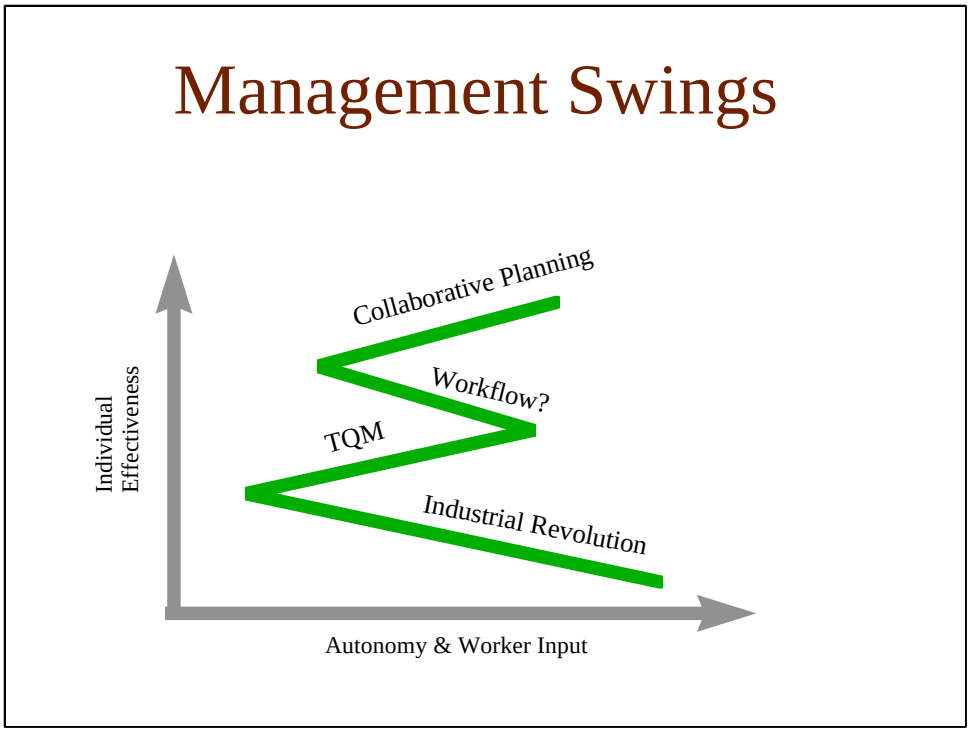
Experimentation and improvement can be made at all levels. Top level plans can be modified to make use of different combinations of services from lower levels. Simultaneously the services of the lower levels can be improved. This situation has been compared to the self-similar aspect of fractals in that you see the same activity happening at the same time at different levels of granularity.

CP Reduces Initial Investment

- **Complete process description not needed before starting.**
- **Since the system is designed around exceptions and responding to them, there is no need to code all possible situations from the start.**
- **Design for change makes a collaborative planning system more responsive.**
- **Better fit for non-quiescent organizations**

Most management experts realize that in order to stay on top an organization must be constantly evolving. Coding a process into a computer system can have the effect of freezing the process at one instance, and may make it costly to change. Clearly, workflow systems need to have specific features to support process evolution. The first requirement is that the process must be easy to modify without the aid of a programmer, so that the barrier to change is diminished. Workflow systems are evolving in this direction with the introduction of graphical process descriptions.

The workflow system might include explicit support for change in the form of template locking and versioning, along with support for migration of improved templates. Allowing change is a start, but to control change such a system should have explicit representation of template authors, and should include authorization and access control to the process templates.



As a company enters into continuous improvement, a CP tool allows better plans to evolve. Each member of the organization can improve their own plans whenever a potential improvement is identified. In accordance with the principles of TQM, ideas for plan improvements may come from the people doing the job that would not have occurred to a centralized process plan effort. March and Simon argue that decentralized planning is always at least as good as centralized planning, and usually much better. Removing the overhead of making a change empowers people to make the change. The result is an organization that is able to learn from the way it works, and to improve, much like the learning organization suggested by Senge.

Effects and Benefits of CP

- **Changes the cycle needed for developing processes. --> More Responsive.**
- **Allows for more parallel development of process descriptions. -->Decentralized**
- **Better fit across all groups --> Individualization**

While production workflow will be sufficient for quiescent, coherent organizations, a CP tool allows turbulent organizations to be more responsive and less centralized.

Collaborative Planning

- **Many people can share in planning**
- **Different parts owned by different people**
- **Plan composed from reusable pieces**
- **Changes allowed at any time**
- **Plans are specific to the instance**

The result is that the actual process of BPR is supported by a Collaborative Planning tool.

As a forerunner of the 2nd generation workflow, a Collaborative Planning tool not only allows process descriptions to change, but furthermore allows these changes to be developed collaboratively.

The overall process is composed from a number of plans constructed by a number of people. The Collaborative Planning tool is unique in this feature, and we are sarting to see the beginnings of some CP tools on the market.

At Workflow ‘95, in San Jose, Fujitsu OSSI and ICL TeamWARE Division are announcing a new product, TeamWARE Flow, which is a new workflow system integrated with the TeamWARE suite of groupware tools that includes the elements of Collaborative Planning. It is based on the Regatta technology developed by Fujitsu OSSI.

Design For Change

- **First Generation Workflow can be made to support a process.**
- **Second Generation Workflow recognizes that processes themselves change, and supports the activity of creating processes.**
- **A Collaborative Planning tool is one that it is designed for continual improvement and re-engineering of processes.**

If the system is not planned for process improvement from the start, it may not be able to support it later. There are a number of features of Regatta that allows process improvement:

1. Separation of template and instance allows improvements to be made to the template without effecting any currently running processes, and changes to existing instances do not effect the template.

2. Any step in a process can have a sub-plan. The original process is unaffected by the addition of a subplan.

3. Partitioning process into plans and sub-plans that are separate templates allows improvement to proceed at different paces at different levels.

4. Different group can have different versions of plans, removing the barrier of getting the entire company's approval before making any change.

5. Plans are expressions that help explain changes to the other people involved. Graphical descriptions are available to every user, not just the designers.

6. Changes are immediately communicated to all client programs: the clients are designed to expect change.

Questions Anyone?

- **Please fill in Session Evaluation Forms**

The Difference Between Workflow and BPR

Keith D. Swenson
Fujitsu OSSI

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