The Future of Workflow Technology: Collaborative Planning

Keith D Swenson
Fujitsu Open Systems Solutions, Inc.
3055 Orchard Dr. San Jose, CA, 95134
kswenson@ossi.com

Workflow is rapidly becoming a standard technology in the corporate computing environment. Workflow automates an actual business process, and as such must have a representation of that process. This paper questions how one arrives at the process to be represented. Collaborative Planning (CP) is presented as a way to discover and implement process representations regardless of the workflow system being used. The need for involving many people in the planning process is the result of a trend which is many decades old, and which is enjoying a new level of awareness due to the Business Process Reengineering movement. CP empowers users within a workflow environment to have control over their own processes. CP is defined and four general requirements for a CP tool are given. The benefits of this new technology are discussed; Regatta Technology is offered as an example of a CP tool.

1 Introduction

The current trend for process orientation in management represents a significant departure from the philosophy that is used to run most companies today. In the first half of this century, Alfred Sloan showed the benefit of factory-like management with separate departments specializing each in a specific functional part of the management activity. This was simply industrial revolution style thinking applied to management, and it caused an economic boom like none seen before, along with companies bigger than had been previously dreamed possible. Yet less than 50 years later we find ourselves in the middle of another management revolution that turns the previous notions upside down.[5]

This paper postulates that the forces reshaping our corporations are also creating an opportunity for a new aspect of software, termed Collaborative Planning (CP). CP will help organizations respond to the dynamics that they face. After a brief discussion of management trends, the requirements of a CP product will be explored, along with the benefits likely to be gained, as well as the inherent drawbacks of this new technology.

1.1 What is Business Process Reengineering?

Business Process Re-engineering (BPR), a term coined by Michael Hammer [12], is today's hot buzz word in management circles. Proponents of BPR tell us to reevaluate how our organizations work and redefine this work in terms of processes to satisfy specific goals. Each task is considered in relation to the process as a whole and ultimately to the satisfaction of the customer of the process. At the simplest level, a process oriented approach means to bring a representative of each function into a single team which works together. The team can specialize to meet the needs of that product or service, removing redundant steps, adding in steps for special requirements, and fine tuning itself for the needs of the customer.

There is ample evidence of the popularity of the principals behind BPR. IDC estimates that the 16 largest management consultant firms in the US have provided $1billion in BPR consulting in 1993. Stories of successful BPR are impressive. IBM Credit reduced the time to prepare a quote for buying or leasing a computer from 7 days to 4 hours, while increasing the number of quotes by a factor of one hundred. Federal Mogul reduced the time to develop a new prototype from 20 weeks to 20 days, thereby tripling the likelihood of customer acceptance. Even the US Internal Revenue Service re-engineered their processes

so that they are able to recover 33% more dollars from delinquent taxpayers with only half the staff. Michael Hammer points out that goals of cutting costs in half, and cutting response time by 80%, are not unreachable. [12]

1.2 Is BPR a new idea?

Thomas Davenport notes that BPR has roots that can be traced well back to the middle of the century and is a logical outgrowth of the quality movement with its focus on outputs and customers.[6] W. Edwards Deming is a good example of an evangelist of quality who recommended concentrating on processes and the continual improvements of them. The concern for greater efficiency is timeless, and the components used to accomplish this are well tested. The Japanese term, "kaizen", refers to the continuous improvements of processes, something deeply ingrained in Japanese corporate culture. BPR is not simply a fad that will fade away.

It is Information Technology (IT) that brings the new dimension to process reengineering, and is the main reason for the current fervor around BPR.[20] IT surrounds some of the barriers that made functional management a necessity. A user of on-line information no longer needs to be physically close to where the data is stored. No longer is it necessary to send an application to be processed in a special location by different people and the associated inherent delays. A person with an appropriate information system can single-handedly perform what used to take a number of departments. These capabilities of IT allow executives to find radical new processes with dramatic results.

1.3 What are the Benefits of BPR?

The main benefit of BPR comes from the increase in quality of product that results from an increase in the quality of the process. 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, either an internal or external one.

1.4 How Does Workflow Fit In?

Workflow technology is increasingly being seen as a means to help introduce BPR reform. Workflow can be implemented to support the new process, helping users to learn the new process as they use the workflow tool, and overall reducing the amount that the workers need to learn about the new process. While BPR can be implemented without workflow, many companies are turning to workflow because of the specific support for processes that it provides. Yet the designers of workflow systems insufficiently provide for some human aspects of an organization. The following sections outline the reasons that such systems fall short, and then propose a solution.

2 How Do Processes Change?

The central issue in taking advantage of BPR is change. There are two kinds of change which are important to consider: "process improvement" and "process innovation." The difference is not simply magnitude -- it is possible to have a complete redesign of a small department, and to have a large incremental improvement. The difference is really whether the change is imposed from outside or inside the organization being changed, and whether the change redefines basic job functions.

2.1 What is Process Innovation?

Process innovation refers to a major change of an organization as demonstrated by the examples of BPR success where the main processes are reevaluated from the point of view of the customer and redesigned from the ground up. Such changes must be instigated from the top of the organization and supported throughout the organization.

Davenport advises that an organization wishing for successful process innovation should: 1) identify processes for innovation, 2) identify change levers, 3) develop process visions, 4) understand existing processes, and 5) design and prototype the new processes. A process innovation program can not be successful unless it is followed up by a program of continual process improvement. A company that is not successful at continual process improvement will not be successful at process innovation.[6]

International Systems Services Corporation, a business process consultant has identified five steps in the process of change: 1) analyze leverage points, 2) identify process breakthroughs, 3) design business processes, 4) implement business processes, and 5) institutionalize continuous improvements. In this case it is even more clear that both kinds of change go hand in hand.[1]

2.2 What is Process Improvement?

Process improvement, like the Japanese term "kaizen," refers to the continual fine tuning of processes that are already in place. For example a particular group may decide to handle its piece of a process in a different manner, while providing the same basic function. Process improvement can be motivated from the bottom up by incorporating suggestions from workers in a manner reminiscent of Total Quality Management (TQM). In order for workers to be empowered they need to have control over the processes they participate in, and to improve them when they identify a problem.

2.3 What Slows Process Change?

Being creative and innovative enough to come up with the optimal process redesign and implementing the information system is only part of the work. The largest amount of labor will go to working with the people that will be involved in the process, helping them to understand and change their habits to the new way of working, and possibly retraining some of them to perform new and different functions. The greater number of people involved, the more difficult it is to implement, and the greater risk for failure. It stands to reason therefore that any means which can isolate the changes to a smaller set of people, or possibly the minimal set, will be advantageous when it comes time to implement the changes.

Another roadblock for easy process improvement appears when a small part of the organization wishes to make a change just to their part of the plan. If the process is represented as a single monolithic plan, then all of the people and groups involved in that process need to be part of the change approval process, even if their own functions are unaffected by the change. The bureaucratic overhead may be considerable. In some cases the advantage gained from some very small adjustments to the process may be outweighed by the cost and trouble of getting all the approvals, thereby forming a barrier to the introduction of small changes.

If the ability to change is difficult, the problem is compounded by the difficulty of getting the process right the first time. The people involved in the work are often unaware of exactly how the work is done. Shoshana Zuboff points out that skills picked up on the job form tacit knowledge which the worker is unable to express verbally either because they are unaware of exactly what they do, or because they lack the vocabulary and experience of discussing work habits.[29] An example is the difficulty of describing how to balance on a bicycle. To change a process, workers are usually interviewed to discover the current process, but since the interview is limited by the workers ability to describe the work, the process specialist must also observe activity. Even observation can not pick up the reason why a particular action was made in favor of another.

2.4 Do All Groups Work Identically?

While change usually refers to a difference in the processes over time, there is also evidence for needing a difference in the process across the organization. Different groups work in different manners. It stands to reason that for each group to operate optimally they should be able to have their own customized version of a given process. Greenberg has pointed out that groupware that treats all individuals and groups the same has a high probability of failure.[9]

Having a customized process is exactly what process orientation is about. Sale of a large computer system and sale of a reference manual should not be forced to follow the same process merely because they are both sales. Taken to the logical extreme one could imagine a company which has a unique process for selling each different product; this may be appropriate. Yet all of these processes are related because they should appear, at least to the customer, in some sense the same: a sale. Therefore it is not sufficient to let different process teams have different processes, they must be able to have different versions of the same process.

3 Human Aspects of Workflow

IT will make two major contributions to BPR. The first is the ability to remotely access information which allows a single individual to do many things directly. Since information can be delivered anywhere, it should be delivered to wherever it can be of the most use, and that is usually wherever the customer is. Many companies are seeing tremendous process improvements by providing information systems that allow salespeople to, for example, directly check a customers credit, verify inventory of items, schedule manufacturing time, or generate complex quotes on the spot. All of this can be done while the customer is waiting.

The second contribution is when the process involves a number of people, IT can be used to coordinate their interactions. As information access becomes location independent, teams become

geographically dispersed and become more dependent upon electronic communication. Workflow software is needed to provide this communication. CP is primarily concerned with workflow.

Like any groupware, CP 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 mine field until the users and technology adapt to each other, assuming that they are able to adapt. The next few sections point out a number of land mines that we uncovered in the course of development and early testing of our prototype. This can not be a complete listing because CP is a immature area and is still largely untested.

3.1 Why Not Simply "Program" the Organization?

It is all too easy to view the steps in the workflow as being like a program to be executed by the organization. A programming approach to workflow attempts to control the people by forcing them to do the right thing at the right time. This is, in effect, de-skilling the work. An early supporter of this approach was Frederick Winslow Taylor and his principles of scientific management.[26] While Taylor expounded more than eighty years ago the importance of attention to process, his ideas fall far short of BPR because of his assumption that there is a single ideal design for any work process, and his view that people should be subordinate to the process. Robert Howard points out that "Taylorism is alive and well in the assumptions of many technology managers [who] see computer technology, first and foremost, as a means to eliminate, or at least minimize, the human element in work."[15] Besides the obvious lack of appeal to the workers, there are other serious problems that result from trying to program the organization.

Programmed organizations are unable to handle exceptions beyond those provided for in advance. This means that during the investigation and design of the process, much attention must be given to every possible point of failure, and a programmed response must be provided. A side effect of having to provide for all of the possible exceptions up front is that the cost of introduction of the new process is significantly higher. This forms a barrier to adoption. Since so much effort goes into initially creating the process it gains a sort of momentum and becomes very hard to change. This decreases the ability of an organization to respond to change from external sources.

In a programmed organization the worker has lost control of the processes and the work. There is no room for creativity and experimentation; key elements that would lead to spontaneous process improvement. Most workers find this unpleasant and are unmotivated.

As a side effect of the cost of creating a process, the goal must be to implement a single best plan, and to use the same plan for all groups. Since different groups are composed of different people with differing levels of expertise, it is appropriate for them to make use of different processes to accomplish the same task. Optimizing the process to a particular group is very expensive in the programmed organization.

3.2 How Can Users Be Empowered?

Andrew Clement makes a strong case for the need to use information technology to empower the user.[2,3] He recognizes two meanings of empowerment in the context of the workplace. The first meaning comes out of TQM and BPR and refers to the additional responsibilities that a worker gains as the organizational hierarchy is flattened. "Empowerment means that operational decisions will not be made hierarchically, that knowledgeable workers must feel comfortable in making decisions, that managers must provide counsel rather than directives, and that information and our conceptual models of how to use it are the source of decisions"[4]

The second meaning might be termed "democratic empowerment" because it emphasizes the ability for an individual to have control over his or her own situation. Workers empowered in this way might be able to make improvements in any process in which they play a role. Clement presents three examples where such empowerment lead to changes in the work environment and processes which "TQM and business process reengineering advocates would be proud of." Given the ability to change, they made improvements far beyond those that had been considered by the traditional management. The conclusion is that process support needs to be "supporting" instead of "enforcing."

An example of a product widely criticized for its enforcement of a set process is the Coordinator.[8] This product embodied a static model for negotiation based upon a finite state machine. Perhaps the greatest reason cited for the low adoption rates of the Coordinator was the negative reaction that users had to being constrained to a particular set of moves, and the feeling of being forced to do something they did not want to do.

Traditional workflow has been often criticized for its lack of flexibility. Too often the flow definitions are too simple to handle the richness of real world problems. A study by SRI found that lack of flexibility was a common complaint among work flow users.[17]

3.3 Intelligence behind the Rules

Failures at automating office work may arise from the attempt to literally implement the rules of the office. Workers 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[14] 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 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.

3.4 Why is Data Flow Inadequate?

Modeling the work process as a data flow model is initially attractive because it is so similar to the way information is exchanged on paper, which is physically transported from person to person. Yet the first important contribution from IT lies in the location independence of information. Modeling the process as documents flowing from person to person gives a location to that information which is contrary to this benefit. Even attempts to work around this by making every document flow to every person gets conceptually difficult when the process involves parallel paths. A better approach makes all documents potentially accessible at every stage so there is no need to represent the flow of data.

3.5 Why should the User also be a Planner?

One theme common to all approaches to reengineering organizations is to involve the worker as much as possible at every stage.[6][12][10][18][29] Major process innovation is inevitably top-down and is imposed from "outside" to organization. This type of change is easy to implement in any workflow system because a new process definition can always be designed separately and introduced to the organization.

The real difficulty is supporting bottom-up process continual improvement. The separation of the user from the planner forms a barrier to process improvement. When a small improvement to a process is identified, the bureaucratic cost of involving a second person, or more likely a separate department, will outweigh any potential benefits. Jonathan Grudin has noted that group support systems fail when there is a separation of the person doing the work and the person gaining the benefit.[11] A system that is designed to allow the user to make changes to the plan is the only solution. Studies have shown that only about 10% of spreadsheet users actually modify spreadsheets. In a similar vein, not everyone is expected to actually make changes to plans. Rather, it is the potential for change by anyone, and the ability to trade templates, that makes the difference to allow incremental process improvement.

4 A Definition of Collaborative Planning

Planning is used here to mean the activity of constructing plans of action (also known as process definitions) which will be used to coordinate future work. There exist two sorts of plans: plan instances and plan templates.

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.

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.

4.1 What is the Process that creates a Process Definition?

All workflow systems have, by definition, some form of process definition. The definition format from different vendors have different strengths and weaknesses: Some are graphical, some are script-like, and some are state based. Collaborative Planning is not concerned with the strength or suitability of the process description. What is of concern for 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 include features to support the planning activity, including the interactions between people that necessarily take place during the creation and evolution of plans.

Workflow vendors are beginning to realize the limitations inherent in the separation of planner and worker and are starting to produce workflow systems with CP capabilities. The goal of this paper is to identify the common features that all such systems require in order to be truly considered CP tools.

5 Requirements for a Collaborative Planning Tool

There are four general requirements for a CP tool to be successful. First, the tool must designed so that plans can be created by an average user. Second, it must have some features to support multi-user plan creation. Third, it must be able to support modification of active plans. Finally, it needs to support differentiation of plans for different groups.

5.1 Support for End Users

A CP tool is designed to be used by end users without specialized training. Effort to avoid needless embellishments is critical. 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.

The key to making plans editable by end users lies in a having a clean graphical representation of plans. A number of workflow tools are appearing that support a graphical representation of plans. Most project management tools have at least a PERT chart representation. Workflow tools that only display the plan graphically, without allowing editing, stop short of a real solution. End users expecting a WYSIWYG environment will want to construct and edit the plan graphically.

5.2 Support for Multi-User Planning

Responsibility for the work and responsibility for the plan are closely related. Michael Hammer states: "Companies that have reengineered don't want employees who can follow rules; they want employees who can make their own rules. As management invests teams with the responsibility of completing an entire process, it must also give them the authority to make the decisions needed to get it done."[13] Involving a group in the planning activity implies that a group is involved in the responsibility of the task.

While empowering multiple people to create and modify plans simultaneously, the collaborative planning tool must give the planners control over the changes. A planner who is responsible for the result of a plan fragment must have some assurance that his or her plan has not been improperly modified. Reflexively, that planner should not be able to change someone else's plan fragment.

We draw as a conclusion from this that the planning tool must support some form of plan fragmentation where different capabilities can be assigned to different people for different fragments. At a very minimum the plan fragment should have an owner who is allowed to change all aspects of the plan, and who can assign other capabilities to others. The requirement for fragments seems to come directly from the desire to allow multiple people to be involved in the planning process, and not from any specific implementation goal, much in the same way that file ownership and access controls are a fundamental requirement for a multi-user file system.

Process instances are composed of a number of plan fragments, but plan templates must be a single fragment. Since each person has control over a plan fragment, it stands to reason that the plan fragment should be initialized with that person's template for that fragment. The act of creating a complete plan instance from a collection of plan fragment templates is an important part of CP. A plan binding mechanism will construct a complete plan from fragments and this will accommodate the individual needs of the people or groups from whom the templates were taken.

While CP allows people to view each others plans, invariably some members of the organization do not want their plan known. The CP tool must have a privacy mechanism that gives the plan owner control of who may view the plan.

5.3 Support for Process Improvement

The end users involved in the planning will neither be experts in how to plan, nor will they be able to devote a large amount of time. Typically, they will not get the plan correct from the start. Occasions will arise for which the plan is not prepared.

Changes to the plans must be allowed on-the-fly after starting enactment. Without the ability to change process plans on-the-fly, the end user would be

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.

Being able to change an active plan is not enough. The user must also be able to change the plan template at any time without undesirable side effects in active processes. An instance of a process by its nature will persist for a length of time, in some cases for years. If the organization is continually improving there may be several versions during the time the instance is active. We have found the proper solution to this to be a separation of the instance from the template. In general, once a process is started, to remain consistent it should complete with the same version of a process. The change of a template should leave the instances unaffected. The system must be able to support instances with different versions of a process being enacted at the same time.

CP tools must accommodate users who have been familiar with a particular process and who unexpectedly discover that the process has changed. The process must be accompanied with enough explanation so that a user confronted with an unfamiliar step in a process can immediately find enough information to be able to able to take the appropriate action.

5.4 Support for Individual and Group Optimizations

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 process support environment is directing workers' actions, so the process plan carries some authority while it is being enacted. Though it is critical that users be able to change their own processes, it is also critical that the inappropriate version of a process be prevented from use. It must not be possible for a person to forge a new process, and then to run it at the authority of someone else. The system must enforce a proper mapping between authority of a process and the designer of a process.

In practical terms there will be a large number of plan template types. While the system allows each person to have their own version of a template, it would be tedious if everyone was forced to have every kind of plan template. From experience we have found there needs to be a mechanism to allow users to specify another place to "inherit" plans from.

6 Benefits of Collaborative Planning

6.1 Better Plans

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 when ever 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 centralize process plan effort. March and Simon argue that decentralized planning is always at least as good as centralized planning, and usually much better.[18] 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.[21]

6.2 Ability to Experiment

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.

6.3 Process Capture

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.[18]

6.4 Improvement at all Levels

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.

6.5 Save Planning Time

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.

6.6 Better Feedback

A CP tool is designed to be easy to understand. If it succeeds in this goal, more people from the organization can be involved in the planning process, and feedback from all people involved is more accurate.

A CP tool surrounds the problems associated with process discovery through interviews and observation by allowing users to directly manipulate and experiment with processes. Tacit knowledge is learned by trial and error; a CP tool allows processes to be discovered and improved by trial and error, in order to tap some of that tacit knowledge.

7 Regatta Technology

The Regatta Project was started in 1991 within Fujitsu to explore groupware technologies. The three goals are to develop software to 1) support coordination of work, 2) help users understand how their group works, and 3) support the change and improvement of work processes. With these goals in mind, and generous sponsors in Japan, Regatta Technology was developed.[22, 25]

7.1 Shared Space for Collaboration

Primarily, Regatta offers a shared space for collaboration[19] which contains data, artifacts, and a collection of plan fragments. Access to the space is allowed only to participants which have been specified. The system provides a list of all active tasks on the plans, as well as the options for each of those tasks. A record of user interaction is kept to provide a history of the process to participants. Platform independent forms allow for consistent presentation of data on any client platform.

7.2 Visual Process Language

Regatta includes a graphical representation of a plan that is elegant and easy enough to use, yet powerful enough to handle all the needs of an average business user. Regatta's graphical planner (editor) allows an end user to edit Visual Process Language (VPL) diagrams directly. The same VPL diagram is used to display the current status of the enactment.

Zisman did early work in the area of representing office procedures with Petri Nets.[27,28] VPL is a parallel language which has properties similar to Petri Nets but it has been specialized for the needs of collaboration and work processes. VPL is quite similar to Ellis' Information Control Nets[7] except VPL is simplified by omitting the document flow.

Plans are composed of stages which represents task to be done. A stage can be active or inactive to indicate whether it is time for that task to be done. Stages can be programmed to respond to particular events, and to send events to another stage in order to activate and deactivate each other. Stages are represented by a bisected ellipse with the role assigned to the task in the upper part, and the description of the task in the lower.

Stages are programmed by placing options (another graphical object) on them. An option looks like a small circle on the edge of the ellipse with an arrow pointing to the stage that will receive the event. When the stage is active, the option appears as a menu item to the user. Choosing that menu item triggers the option, sending an event to another stage, possibly activating it, and optionally deactivating the originating stage. Four other nodes of lesser importance exist to fill out the capabilities. Experience has shown that VPL is simple to understand, yet powerful enough to represent a wide variety of processes. More completed descriptions of VPL can be found in [23, 24].

7.3 Plan Binding

Regatta supports plan fragments. A user who is assigned to a stage can invoke a plan template containing subtasks to complete that stage. The subplan for a stage forms a different plan fragment for which that user is the owner. Plan owners may make any modification in the plan through the graphical editor at any time during the process enactment. The enacted plan is a copy of the template, so changes to

the template, do not effect the active process, and vice-versa. A subplan for a task can also be in a separate collaboration space thereby assuring privacy, and only the result is communicated.

Regatta does not require a plan in all situations. Any stage can be handled manually. Each user who goes to the trouble of providing or improving their templates for a particular task will also receive the benefit. It is important for success that the same person receive the benefit that does the work.[11]

7.4 Status

Regatta Technology has been in beta test in real office use since June 1993 in a number of sites within Fujitsu. The largest installation involved a team of 18 software engineers who used Regatta to track over 300 independent modules through 5 phases of development which lasted 8 months. Quality assurance was tracked through each phase. Within weeks of installation Regatta was supporting development processes. The ability to modify plans was shown to be essential to keep up with the changing understanding of the process. The result was that productivity was substantially improved, the final quality was assured by the knowledge that every module had been correctly processed.

8 Conclusion & Summary

Business process reengineering is here to stay and will become increasingly important as a way for corporations to remain competitive. Workflow technology is a strong option that corporations have to help them through the BPR. A program of continual improvement of processes is needed to assure the organization remains on top, but is difficult to implement in most current workflow systems which support a more centralized style of planning. Collaborative Planning is a way to empower users to have control over their own processes, while integrating into the processes of their organization. CP has four basic requirements: end user programming, planning by multiple users, support for plan change, and different plans for different groups. Regatta Technology is an example of an existing CP tool which has been shown to be effective in a live environment. As the BPR movement gains momentum, the need for CP tools will become more clear, and more example will appear.

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