Payoff

Joint application development (JAD) techniques improve the quality of applications and the efficiency of the development process. Yet the facilitated group approach that forms the basis of JAD methodology is also useful for empowering employees and managing group work across a broad range of organizational decision-making and systems development tasks. Viewing JAD within this broader context allows for closer alignment of IS systems with corporate strategy and improves the chances of successful IT–based reengineering efforts.

Introduction

Increasing competition in the business environment has generated new management trends. One trend suggests that successful organizations are those that create environments that foster continuous learning, which in turn fosters continuous change. Sharing knowledge empowers individuals to act.

The impetus behind the trend toward change–focused learning is found in such developments as Total Quality Management; the advent of high–performing, self–directed teams; participatory management; global competition; and changing information technology. Change–focused organizational learning has the potential to improve response times, broaden general knowledge, lower costs, and improve customer service. Because learning requires transfer of knowledge between organizational members, it also reduces organizational dependence on individuals and may add depth to organizational resources.

Another new management trend suggests that employee empowerment yields substantial benefits to organizations as a whole and to individual functions. For example, empowered groups at Corning Inc.’s IS division are credited with achieving the following results:

- The division functions with 48% fewer operations personnel than the industry average, and 29% fewer total data center personnel than the industry average.
- Help desk calls resolved immediately increased from 75% to over 90%, and the customer satisfaction rating improved from 78% to 100%.
- Operations services reduced staff by 20% and errors by 70%.
- Employees deadlocked in the same positions for more than 20 years developed job skills allowing them to move to new jobs.
- Resources were reallocated to other pressing IS needs.

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A direct contribution was made to Corning’s bottom line through generated savings of more than $500,000 annually. 86

Thus in the last few years, organizations experimenting with leaderless groups, quality circles, and participative management have reported increases in productivity and quality. They have also reported increased employee satisfaction and lower turnover. Yet despite the benefits of empowerment, implementation is frequently problematic.

There is a process that can help the IS department reap the benefits of empowerment. Joint application development (JAD)—a facilitated process for using employees in groups to specify requirements for information systems—offers the promise of:

- Improving the quality of delivered information systems.
- Enhancing employee participation and learning.
- Yielding many of the same advantages of employee empowerment programs.

Through a series of facilitated sessions, JAD provides an efficient process for collecting information and generating novel solutions to problems. The result is generally higher-quality applications and smoother project implementation.

This article briefly examines the JAD process and then suggests ways that JAD can be used to more tightly link the development of information systems to corporate strategy. It discusses the benefits of JAD for the IS department and the applicability of JAD techniques to broader organizational tasks.

The Process of Facilitation

Developed in 1977 by Chuck Morris at IBM Canada, JAD methodology applies facilitation techniques to the development of system specifications. These techniques involve the use of formal procedures to prepare for and manage group sessions.

Although JAD is generally used by IS groups to generate detailed specifications, the methodology is useful as a general approach to managing group work across a broad range of organizational decision-making or systems development tasks. For example, team building is a facilitated process that uses a neutral facilitator or counselor to help organizational members define mutually supportive goals and processes. Facilitated sessions are useful when organizations begin to initiate the open dialogue necessary to form organizational strategies, create mission statements, or build common mental models of organizational processes and problems. 87

The JAD process is straightforward. An executive sponsor approves a project and selects a neutral facilitator with the assistance of IS management. Other participants are selected for their functional business knowledge or their detailed task-specific knowledge.

All participants are interviewed and informed of the upcoming session. Information is collected to identify potential conflicts, requirements, operating assumptions, work flows, and system processes. Details of current reports, screen interfaces, menu structures, or other elements of the current system or work process are also documented. Identification

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of open issues (i.e., potential conflicts) is essential for later resolution during the sessions. The facilitator and scribe prepare agenda, ground rules, lists of issues and assumptions, and lists of the basic requirements and functions of the proposed system.

Following the interviews, functional representatives participate in a group review of application requirements and design specifications. Participants are asked to adhere to specific ground rules during the sessions. For instance, attendance is mandatory—participants must attend a three–to–five–day group session.

Because consensus is a goal, decisions are based on shared agreement. Consensus is defined as agreement that all participants recognize as necessary and will support, even though some may not personally agree with what has been decided. Building consensus requires resolution of open issues. If an issue is not resolved, the facilitator assigns someone responsibility for its resolution.

The facilitator uses an agenda, charts, and visual aids to keep the process on track. If conflict occurs, the facilitator may invoke a ten–minute rule stipulating that disagreements not resolved in ten minutes are documented as open issues. The final documentation is similar to documentation developed in traditional systems analysis and design efforts.

**Joint Requirements Planning**

Facilitated sessions can be used to define strategic requirements, functional needs, user requirements, and implementation details. A project with distinct phases may involve a series of sessions with different participants in each phase. For example, the development process frequently begins with joint requirements planning (JRP). The facilitator interviews individual senior executives to identify their key requirements. Then a joint requirements review is held. The requirements review is a facilitated session, and the desired result is an approved set of clearly stated functional requirements. A signed document containing the requirements is forwarded to the executive sponsor for approval before initiation of the next phase.

Exhibit 1 depicts the potential series of requests and inputs used in successive sessions and the corresponding status reports provided to the executive sponsor. The executive sponsor and three groups are involved in the process: senior managers who define requirements, end users, and the development team. Numbers associated with information flows denote the possible sequence of events; each number represents one cycle, and appropriate subevents are denoted with letters. As indicated, decisions made by the executive sponsor trigger the process and are required for continuation from phase to phase.

**The Facilitation Cycle**

M. Kettelhut, “Group–Centered Systems Development: Improving the Development Process of High–Quality Systems,” *Strategic Systems* 4 (June–August 1992), pp. 3–9. To begin, the facilitator solicits input for definition of key requirements. If there is disagreement over the functional requirements, a JRP session may be held. Later in the development cycle, the user group may review screen designs and prototypes. At each iteration, participants determine acceptability of the current product and the facilitator reports their decision to the executive sponsor. The groups are empowered to make key decisions that they agree are essential. On the other hand, the sponsor retains veto power and can stop the development project.
This iterative group approach has three benefits:

- The exchange of information and discussion of new points of view increases quality.
- The sharing and documentation of knowledge increases organizational learning and reduces organizational dependence on individual employees.
- The executive sponsor exercises control over the project as it progresses toward completion and has the opportunity at the conclusion of each phase to assess the group's work.

**Linking Applications to Organizational Strategy**

Use of an iterative group approach can increase the effectiveness of IS groups involved in implementing organizational strategies that depend on information technologies. An organization should begin by defining its strategic goals, competitive position, and critical success factors (CSFs). These lead to specific functional requirements that are detailed through decomposition. Decomposition provides task–level definition for organizational procedures. Implementation of business applications requires detailed, task–specific knowledge.

Suppose processing time in physical distribution is a CSF. Physical distribution functions may be decomposed into, for example, order processing, inventory, warehousing, packaging, and shipping. Organizations that focus on total quality may benefit from having the project manager, the facilitator, or the JAD team work directly with customers to determine which physical distribution tasks are most important to the customer.

As the project moves from requirements definition to detailed design, the knowledge required of participants shifts dramatically (see Exhibit 2). At project initiation, strategic perspectives address critical factors, the external environment, competitors, and strategic alternatives. These perspectives must be transformed into functional requirements and then into application modules, a process requiring knowledge of the functional processes under consideration and their relationship to other organizational processes. Staff with detailed knowledge of procedures is required at this stage to ensure accurate mapping of functional tasks to application modules. As processing steps for each module are defined, programming knowledge becomes more important.

**Knowledge/Task Changes in the Development Cycle**

M. Kettelhut, “Group–Centered Systems Development: Improving the Development Process of High–Quality Systems,” *Strategic Systems* 4 (June–August 1992), pp. 3–9. Although Exhibit 2 depicts the level of expertise required through various phases, it does not clearly indicate the source of information used or the type of information required to implement new strategies based on changes in IT applications or architecture. Exhibit 3 presents a framework suggesting linkages between organizational hierarchy, key management responsibilities, and the functional requirements of organizational systems. Types of activities appropriate in facilitated sessions are also noted. As Exhibit 3 illustrates:

- Strategy is defined at the apex of the organization and implemented by executive management.
For requirements definition, executive management translates responsibilities into performance standards.

- Requirements are translated into specific applications within functions and details of implementation are defined at the operational task-level of the organization.

- Task-specific user knowledge is required for specific application input, output, and processing requirements.

**Linking Applications to Organizational Strategy**
<table>
<thead>
<tr>
<th>Group</th>
<th>Organizational Level</th>
<th>Functional Responsibilities</th>
<th>Development Process</th>
<th>Outcome</th>
<th>Development Phase(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEO, Board, President</td>
<td>-Strategic planning</td>
<td>-Workshops to define strategic use of technology</td>
<td>-Critical Factors -Visible senior management support</td>
<td>-Project definition</td>
<td></td>
</tr>
<tr>
<td>Executive Management</td>
<td>-Operational planning</td>
<td>-Use senior staff to model the enterprise to define high quality solutions for cycle times, data currency accuracy &amp; high level requirements analysis</td>
<td>-Standards for Study</td>
<td>-Feasibility for Study</td>
<td>-Require-</td>
</tr>
<tr>
<td>Staff/Middle Management</td>
<td>-Budgeting</td>
<td>-JAD sessions to accelerate design and define high quality solutions</td>
<td>-Information Requirements for cycle times, data accuracy &amp; high level requirements analysis</td>
<td>-Design for cycle times, data currency</td>
<td>-Analysis for cycle times, data currency</td>
</tr>
<tr>
<td>Production Organization</td>
<td>-Production planning</td>
<td>-End-User reviews of prototypes and specific management of interfaces</td>
<td>-Screen Definitions Design for cycle times, data currency</td>
<td>-Detail for cycle times, data currency</td>
<td>-Design for cycle times, data currency</td>
</tr>
</tbody>
</table>

The participation of senior management ensures the transfer of strategic knowledge. This is particularly important when an organization's ability to compete depends on its ability to leverage information technology. The participation of middle management builds commitment and provides visible indication of support to end users. Finally, successful
construction of an application requires end–user involvement to define system interfaces, tests of functionality, and prototyping of changes.

**Strategic Benefits**

Studies report that use of JRP and JAD for system specifications reduces total project time by an average of 40%. Controlled experiments conducted by CNA Insurance Co. found that JAD methods increased productivity in the analysis and design phases of a project by 50%. The real difference between JAD and traditional approaches may lie in the compression of the one–on–one interviewing process into a three–to–five–day meeting in which a group defines and approves the system specifications. 88

Although saving time is important, JAD also provides a formal structure supporting group interaction in a participative environment. The group approach provides direct benefits:

- It reduces the probability of developing the wrong application.
- It reduces errors in specification that are one to two orders of magnitude more expensive to correct after implementation than during the analysis and design phase.
- It increases user acceptance and improves implementation.
- It broadens the base of participation and therefore furthers learning while reducing organizational dependencies on any single individual.

Learning is facilitated by a participatory, democratic environment, and workplace learning is maximized when people bring what they are learning into conscious awareness. Conscious awareness occurs during the questioning, reflection, and feedback that occurs in the facilitated session. It permits deeper understanding to emerge from otherwise everyday activities. 89 Good facilitators skillfully manage the interactive processes used in group sessions to help participants develop communication skills that focus on common meaning and encourage reflection about both the process and content of the discussion. 90

Facilitated development should be viewed as a natural step in the evolution of applications development methodology. Just as quality circles have proven effective in improving the quality and efficiency of manufacturing processes, JAD contributes to the IS development process.

**CSFs of Strategic Implementation**

Some organizations adopt participative practices only superficially. These organizations may publicly state their philosophy, but closer examination suggests that groups are not really empowered and that participation actually means more meetings but not more autonomy for participants.

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90 Senge, *The Fifth Discipline*. 
On the other hand, several organizations have built their reputation and success around participative management approaches and the use of teams. These organizations are frequently industry leaders. 91

The strategies for moving to empowered organizations with self–managed teams are not complex. One common thread underlying the implementation of quality circles, JAD, empowerment programs, and other participative management initiatives is the creation of an appropriate communications environment.

Organizations that capitalize on their human resources follow specific communication practices. One of these is full disclosure of operating information, such as specifics on the organization's cost structure and earnings.

Many organizations create unique cultures or value systems that support participation and empowerment. 92 R.M. Schwarz suggests that organizations' value systems must ensure:

· The availability of valid information.
· Delegation of decision-making authority that lets employees make free and informed choices.
· A decision-making process that fosters internal commitment and choice.

The importance of these values to JAD is described in the following sections.

**Valid Information.**
During JAD sessions, the facilitator reviews all the information collected from participants in the interviews that preceded the sessions. This public review lets participants challenge and validate the information. To maintain a focus on problem solving, the facilitator emphasizes the group's opportunity to start with a clean sheet of paper and discard the processes they have used in the past without respect to who designed them or how they were implemented.

Schwarz's values are reflected in these practices: information is shared with the help of the facilitator to ensure understanding. Furthermore, the independent presentation by the facilitator allows the group to validate information without regard to its source. Finally, the clean–sheet approach formally suggests the group's ability to change practices that result from previous decisions.

**Free and Informed Choice.**
In well–orchestrated JAD projects, the support of senior management ensures that individuals who are selected as participants have relevant knowledge and interest. The participants are empowered to make decisions, and the facilitator helps prevent coercion or manipulation of any participant.

**Internal Commitment to the Choice.**
Virtually all research examining commitment and participation suggests that involvement in the decision–making processes increases employee commitment. Furthermore, user participation in the development of information systems is one of three recurring themes in

studies of successful development projects. The other two are clearly defined objectives and strong management support.

Organizations that adopt value systems such as those proposed by Schwarz empower their employees. One well–known organization that empowers its employees is Nordstroms, the Dallas–based high–service department store that outperforms most competitors. Nordstroms’ value system is based on only one simple rule: “Use your good judgment in all situations. There will be no additional rules.”

The values prescribed by Schwarz suggest that organizations must avoid three dysfunctional behaviors:

- Misuse of participation. Such situations occur when participants recognize that there is a legitimate need to work as a team to solve a problem, but individuals are neither interested nor qualified.
- False participation. This behavior occurs when a leader invites a group to a meeting but proceeds to sell his or her own ideas or agenda without allowing real participation.
- Scapegoating. The organization finds fault with individuals or groups.

The first two behaviors lead subordinates to recognize the organization's initiatives as phony and to react negatively to them. The third contradicts the need for an organization using participative approaches, and specifically delegation, to be willing to allow individuals or groups to make an occasional mistake. When problems are identified, organizations must react proactively by focusing on finding solutions and learning how to prevent recurrence.

Proactive organizations that avoid these behaviors are better positioned to adapt facilitated approaches to systems development because participants recognize that they can make a difference during the process.

**JAD and Change Management**

Today's competitive business environment presents several challenges to IS departments. Foremost is the pressure to reduce costs: many corporations are still downsizing, rightsizing, or outsourcing. Many organizations that have outsourced the operations portion of their IS department must still complete the analysis and design tasks, if not the actual programming of new applications. This environment highlights the importance of JRP and JAD for efficiently defining requirements and design specifications and producing what are often more–effective higher–quality solutions.

Other business trends—service orientation, changing technology, Total Quality Management, teams, participatory management—are driving organizations to adopt a culture supportive of learning and change. These trends have also heightened interest in organizational reengineering.

Reengineering is a complex process. Reengineering projects that depend on leveraging information technology increase the pressure on the IS department. A great many reengineering projects have failed because of mismanagement of the change process. Participative approaches like JAD provide a formal framework for managing change by making affected groups part of the process and by building consensus.

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93 Pfeffer, *Competitive Advantage Through People.*
The growing use of JAD reflects its potential in the area of change management. JAD sessions may make use of computer–aided software engineering (CASE) tools to capture information or Group Decision Support System to automate the brainstorming sessions. IS organizations that market facilitation services can extend the benefits of facilitation to other organizational tasks such as strategic planning, creating an organizational vision, or reengineering projects.

Organizations whose IS departments use and market JAD techniques can gain a competitive edge for the following reasons:

- They will develop systems faster, with fewer problems in specification, greater user acceptance, and smoother implementation.
- They will improve the quality of delivered applications and provide developmental opportunities for IS personnel.
- They will provide opportunities for IS developers to gain sorely needed business expertise.
- They will be better positioned to take advantage of new end-user technologies such as client/server computing, distributed data bases, and Graphical User Interface.94

These benefits accrue to the organization as a whole. In the IS department, the process leads to more stable application designs, less maintenance, and lower staff turnover. As turnover declines and maintenance requirements are reduced, organizations improve their capability to respond to environmental changes within their current resource constraints.

Conclusion

Two steps are required to realize JAD's potential. First, the organization must understand that implementation of JAD is a step toward employee team building and empowerment. The organization must be committed to changing its culture as needed to reflect values that support participation and empowerment.

The process of empowerment requires that management allow workers to take responsibility for their day–to–day tasks, including planning, scheduling, human resource decisions, quality control or quality assurance, and customer satisfaction. In essence, the process is one of building trust. The team at Corning asserts that there are eight key success factors for group empowerment:

- Start with a vision and clear goals.
- Ensure management commitment, visible support, and a willingness to take risks.
- Pay particular attention to middle managers and supervisors.
- Involve staff in all phases of the project.
- Communicate, communicate, and communicate some more.

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· Keep your eye on the ball.
· Educate all those involved.
· Develop a reward system that promotes success. 95

These factors also form the basis for successful use of JAD techniques in the IS organization. However, JAD is usually viewed as a technique used by a development group for a specific project rather than as a process of group development/empowerment that can be institutionalized. Many organizations that use JAD establish new teams for each new project, and team membership usually changes. The creation of functional JAD teams responsible for the ongoing development, implementation, and maintenance of applications in a given organizational function is the first step toward the creation of empowered development groups.

Implementing JAD, a methodology with known benefits, supports the process of group empowerment and increases organizational learning. The structure used in JAD resembles the processes organizations have used for structured reviews of code.

IS managers will find useful information in several of the works discussed in this article, including information on where to receive training. Investing in formal training that prepares managers and analysts to act as facilitators in group sessions involves minimal risk and offers high returns that encompass more than the initial capital investment.

**Author Biographies**

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Michael C. Kettelhut is associate director of data administration at Dallas–based Alcon Laboratories. He has previously held positions involving research and strategic planning in the service and manufacturing industries.

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95 Shrednick, Shutt, and Weiss.