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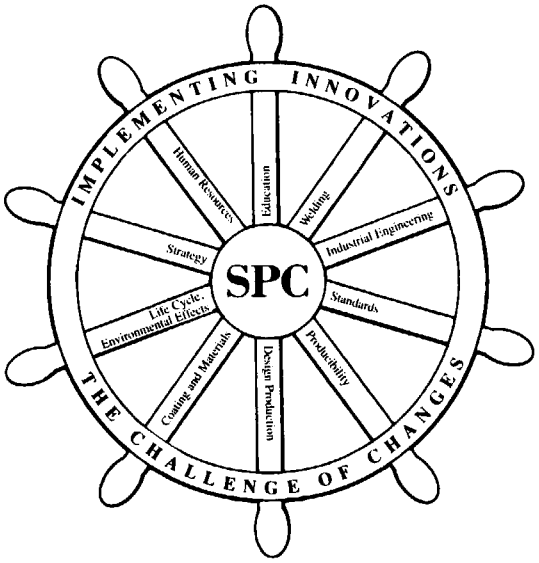

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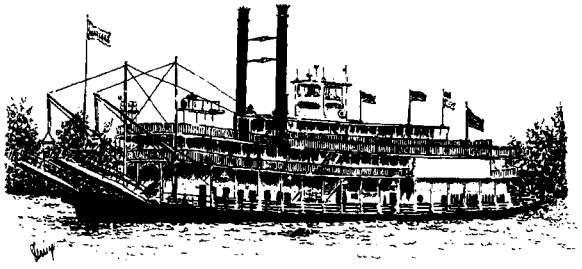

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601 PAVONIA AVENUE, JERSEY CITY, NJ 07306

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An Approach for Improving White-Collar Productivity

No. 5A-1

Rodney A. Robinson, Visitor, Robinson-Page-McDonough and Associates, Inc.

ABSTRACT

The bastion of the white-collar segment within the typical shipyard has rarely been penetrated by outside influences, especially under the banner of productivity improvements. This paper will discuss enlisting the talents of both white and blue collar employees to gain some advantages in this area.

The technique espoused here is the empowerment of selected employees at the operational level through the use of Action Teams. This is the level at which daily shipyard operations are conducted, above the worker level and below the management level. A recent project sponsored by SNAME Ship Production Committee Panel SP-5 on Human Resources, and performed under the National Shipbuilding Research Program (NSRP), conducted a hands-on application of this theory in a small shipyard with favorable results. This project will be discussed in some detail, including:

(1) the rather extensive preparations conducted at the management level before any other efforts were expended;

(2) the formulation 01 two separate Action Teams of representatives from nearly all of the white-collar segments of the shipyard, along with carefully selected members of the blue-collar community;

(3) the implementation activities that. occurred over 8 months; and

(4) the overall results obtaincd.

This initial project was sufficiently successful that. a follow - on project was immediately prosecuted by Panel SP-5. Although the second project was not completed prior to the preparation of this paper, an update will be provided so that the audience may stay abreast of this fast-moving scenario, which promises to provide anothcr practical tool for- developing shipyard productivity improvements.

INTRODUCTION

The magnificent Grand Canyon bears a striking resemblance to a common problem in our shipyards. How immense this natural wonder really is - so wide, long, and deep. By analogy, one is reminded of the dimensions 0f a major difficulty found in nearly every shipyard, except perhaps for the smaller ones with less than 500 people. This difficulty is the communication gap that exists between the white-collar people and the blue-collar production work force. Such an observation is not the off-hand opinion of a chronic skeptic, but the distillation of many first-hand observations in both areas over quite a few years. There simply IS NOT A close working relationship between these two shipyard groups - with each side freely announcing that the other is the one at fault.

One Perspective

In one admittedly biased view of a shipyard, there is a production work force (the blue-collar segment) that performs the basic functions of that enterprise. All the rest of the people are there to provide support to that production work force. This latter group constitutes the white-collar segment - engineering, material procurement, estimating, accounting, human resources, data processing, central planning and scheduling, and management. Certainly the white-collar people have their own interests and concerns, but ultimately they MUST align their efforts so that the production work force can best utilize the support provided to them. This challenge does not rest with the white-collar segment alone, hut i:; shared equa1ly by the production work force. There is no contradiction in terms here, because the key to success is TEAMWORK. All of the players must make their best contribution to the common good. The term TEAM WORK is receiving much attention these days, and hopefully it is here to stay.

Response.to the Request for Proposal

It was in this frame of mind that a response was prepared to a Request for Proposal issued by SPC Panel SP-5 on Human Resources in October 1989. The project called for some relatively fearless person to penetrate the bastion of the white-collar world in a selected shipyard, establish a beachhead, pick out one or more promising targets, and set about the task of improving the productivity of those white-collar segments through the use of employee involvcmcnt techniques. There was not much experience on the books concerning forays into the white-collar community within the shipyard industry, and this project was attractive to one who has been active in several segments of the white-collar world during a busy profes-sional career.

The proposal noted that this project would be a challenging effort. The white-collar regimen would be for-midable, and breaking the paradigm of white-collar attitudes and activities firmly entrenched over many years of ostensibly satisfactory service would not be easy. As an added difficulty, visibility into the arena of the white-collar people has been hazy at best, with the haze growing more dense as the overall size of the shipyard increases. White-collar inefficiencies and their associated expense to the shipyard are often invisible to management, who simply see the production work force as not producing adequately. A common reaction is to throw more production workers at the problem, and to step up the application of overtime in order to meet the delivery schedule. These actions treat the effect, but not the cause. And since the production worker portion of the shipyard is the largest and most expensive in terms of total manpower cost per day, the impact of such a reaction can be devastating.

Specific Considerations

The proposal contained two rather severe conditions, which were recognized as potentially difficult for the Panel to accept, but which had to be voiced up front. The first was that the task should be carried out in a small ship-Yard, where representative conditions existed but where the added problems attending the larger white-collar organ-izations were minimal. This would allow the investigation to treat several different full segments of the white-collar work force, rather than being limited to only pieces of the larger groups that are found in the bigger shipyards. In addition, the subsequent test application of work redesign tech-niques could be applied to a whole white-collar function in a small ship-yard, rather than only to a segment of that function in a large shipyard. Later on, the techniques developed here could be adjusted to suit application in a large shipyard environment. The first condition, then, would allow the task to proceed more effectively in a small shipyard were the problem areas could be surrounded and treated in a reasonable length of time.

The second condition was that the members of the production work force at the shipyard would be involved in the activities designed to improve white-collar productivity. That is:, the white-collar segment of the shipyard would NOT be the only group treated, as had been the case in other industries. The task would recognize and build on the communications and operational relationships needed between whitc-collar workers and blue-collar workers in order to improve the productivity of the white-collar group. The rationale behind this approach was quite simple, and was based on fundamental information feedback. The white-collar segment produces a product. The principal user of that product is (ultimately) the production work force. The producer must have information feedback from the user on whether the product is producing the results desired, so that adjustments can be applied as necessary. This feedback mechanism ensures that the overall process is carried out in the best interests of all participants.

Communications in Both Directions

Two points are of immediate con-cern.

(1) The white-collar producer needs to understand clearly the basic capabil-ities of the user, and the specific procedures and operations throuqh which the white-collar product will be applied to produce the ship. This information (blue-collar to white-collar) is essen-tial to the initial creation of a product that will be usable and can be readily applied. It might be assumed that the white-collar segment already knows all about the production side of the shipyard, particularly since many of the people in the white-collar segment may have previously worked in production areas. Experience tells us, however, that this is NOT usually the case. White-collar people tend to concentrate (and rightly so) on their own part of the overall effort, which often demands single-minded determination to resolve one onerous issue after another. At the same time, developmental changes in pro-duction techniques, and the dynamic nature of production activities, -gradu-ally move the sensitivitv of the white-collar people further away every day from the pulse of production. Soon the information gap grows to surprising proportions, and continues to widen as

each new production situation presents itself. Unless there is some sort of bridge, regularly traveled by all of the participants, the hope for true progress is dimmed.

(2) The white-collar producer must stay in close touch with user problems and concerns as they develop so that problems can be resolved quickly and decisively. The ostrich technique for avoidinq difficulties does not work in an industrial atmosphere. What you don't know WILL. hurt you, eventually if not sooner. For the white-collar segment to gain the needed degree of intelligence about everyday activities in the production work area requires a system of timely and FAITHFUL communications among all of the people involved. And even this is not enough! Problems must be identified BEFORE they impact production work, causing costly delays and disruptions in the ship production processes. This requires careful and complete communications in the OTHER direction (white-collar to blue-collar), so that the production side can understand white-collar intentions, and can assist in identifying potential problems while there is still tine to correct them with minimal cost in time and money. Again, it might be assumed that our informational networks and problem-handlinq paperwork will obviate this dilemma, and well they might. But since most of this brand of intelligence is generated after the fact, the PEOPLE involved must illuminate such judgmental information before the fact. This is the really tough part of the problem, because it demands an operational closeness among the team members that will survive the rigors of the workplace and allow the stream of communications to continue IN BOTH DIRECTIONS, a condition that is absolutely vital to a successful effort.

Arena Selection

Finding a small shipyard with an on-going workload sufficient to support this investigation was recognized as difficult enough in the prevailing economy. Finding one with a disposition to attempt this sort of improvement effort, and willing to share the findings with the rest of the industry, would be doubly difficult. An agreement, however, was secured with Peterson Builders, Inc., Sturgeon Bay, Wisconsin, to serve as the participatinq shipyard for this project .This shipyard would have an adequate workload over the several months of project performance, a progressive and responsive management team, a dedicated and effective work force, and a wi11ingness to share NSRP task findings with the rest of the industry.

Proposal Features

The proposal offered to develop a four-phased program for performing this task over a period of about 12 months:

(A) measurement of base-line productivity in several white-collar functional areas;

(B) identification of those whitc-collar functional areas most amenable to improvement through cmployee involvement techniques, and other work redesign avenues;

(C) development of work redesign innovations, through employee involvement techniques and other-industrial engineering procedures, for direct application in one of' more specific functional areas; and

(D) test application of' actual improvement efforts in as many white-collar functional areas as the project could support.

A competitive award was made in April 1990, and work began promptly.

PREPARATIONS

The approbation of most senior shipyard management was recognized as absolutely essential to success. Initial preparations, therefore, were carried out to ensure that such support was both present at the shipyard, and was advertised to the workers involved before any measurements were made or discussions were held with the work force. Each senior manager associated with the personnel who might be involved in the task was briefed in complete-detail as the very first step of the project, and thereafter before any other specific actions were carried out. These briefings were done by the project director, usually one-on-one with the-senior manager involved. This portion of the project required a considerably amount of time, but was absolutely essential to successful performance. There must be NO surprises at this senior management level, which included the General Manager, the Vice President of Manufacturing, the Vice President of Operations Support, and the Vice President of Human Resources.

This point of preparation is made first and foremost to emphasize the important of this action. These senior managers were NOT expected to take any specific actions themselves during the project, but would be kept fully appraised of activities as they unfolded, and made aware of each significant new action to be taken before it was attempted. Having these senior manager:: aware of project details, albeit de1iberately distant from the participant::

themselves, created an atmosphere of agreement and support without which the combined efforts of all the players could not have been so successful.

DISCUSSION OF PROJECT ACTIVITIES

Assessment of Initial-Conditions

Comprehensive interviews were conducted with selected personnel from several segments of the shipyard. The participants were carefully selected through consultation with two knowledgeable and established members of the work force, in order to cover a representative cross section of the shipyard. Both white-collar and blue-collar workers were interviewed. Each interview was set up for 1 hour, one-on-one. The same questions were asked each person interviewed to aid in subsequent analysis of the answers. All interviews were completed before any analysis of results was made. This point helped to ensure that bias was not inadvertently introduced during the interview discussions which, because of the number of individual interviews involved, took place over a period of several days. Although shipyard senior management was made aware of who was being interviewed, they did not influence the selection of interviewees or the questions asked of them.

The interviews revealed that the shipyard had committed a large amount of effort to employee training under the Transformation of American Industry (TAI) format, and also to Total Quality Management (TQM), which was renamed and redefined as Continuous Quality Improvement (CQI). It was immediately clear that this project should capitalize on the training already carried out, since a large number of workers had completed these courses and were familiar with many of the techniques espoused. Building on this base of knowledge was expected to improve the likelihood of success.

After all of the interviews had been completed, the results were analyzed and assessed. The overwhelming message was that people were not communicating effectively with each other. Often the only time that common problems were addressed was after an equipment interference was encountered, material was unavailable when needed, or a sequencing problem arose that a trade could not resolve independently. In such cases, the production people were stuck with the problem, which usually occurred well into the ship construction period and with essentially NO time for working out a solution. The white-collar segment would be involved in problem resolution only on request. This condition appeared to be most troublesome in two functional areas; structural, and electrical. The other functional areas of the shipyard appeared to be in a similar but 1ess severe condition.

Establishment of a Productivity Baseline

Several ideas were explored in an attempt to set up a reasonable baseline tot- productivity assessment, as lo:-lows:

First, the number and content of Product ion Change Requests (PCR's) was examined. These documents are generated by production workers as a vehicle with which to communicate with engineering (most often) and occasionally with other support people. It was clear that PCR's were being used only by certain groups in the shipyard, and then only after other avenues had been exhausted. PCR's were clearly not a popular way to communicate, and were often used only as a last resort. Even the name of the form was a problem to some workers, since it suggested that the change was something that production was requesting to satisfy their own interests. In fact, the PCR was simply reporting a problem that needed a resolution so that construction might continue.

Second, the number and content of drawing revisions was examined. These revisions, made by in-house engineering people, were found to be quite dependent on the quality of the basic design drawings received from the outside design agent. This fact may have caused bias in the message gained from analysis of drawing revisions, so this potential baseline indicator was abandoned.

Third, the population of Engineering Change Notices was examined. ECN's are used when problems arise in carrying out the basic design. Since they might reflect the closeness of in-house engineering people with production activities, they would be trackcd further.

Fourth, the mobility of the engineering people was examined to see whether they were personally going to the production sites within their assigned areas of concern frequently, often, or rarely. This indicator might reflect the working relationships between engineering people and production people, and might shed some light on the nature and degree of communication actually taking place.

Fifth, the general attitudes exhibited by the various players were examined. These would be a valuable indicator of just how well things were going, and how close the working relationships were among the several groups involved in carrying out daily operations. If, indeed, improvements could be obtained through employee involvement techniques,

an early indicator would be a change in the personal attitudes of those closest to the pulse of the shipyard.

Determination of Areas to be Treated

The decision on what functional areas to treat was not a difficult one to make. The structural area and the electrical area clearly were most in need of improvements in working relationships and communications. Each area had its own unique problems, but both shared the common need for better and more timely understanding of problems as they developed, and for closer cooperation in resolving matters of mutual interest before a major snag was encountered. It appeared from the start that each of the white-collar groups enjoyed the basic capability to do their jobs correctly and efficiently once they fully understood the details of the problems. What was missing, though, was the faithful exchange of detailed information from production people to white-collar people, and from white-collar people to production people. This gap in communication was the direct cause of an unproductive atmosphere. It was therefore decided to tackle the problem of communication first, followed closely by working relationships in both of these functional areas.

Creation of Action Teams

An Electrical Action Team (EAT) and a Structural Action Team (SAT) were set up as the vehicles through which improvements would be attempted. The composition of each team was established with great care through extensive discussions involving the two shipyard people who assisted in setting up the interviews mentioned earlier. The aim was to include on each Action Team the optimum mix of white-collar people and production people, so that all elements of daily operations in that area were represented. It was desired that each team member be able to recognize the action needed in a particular area, be it engineering, planning, material, or production. In many cases, the Action Team member would be able to carry out that action alone. *in* the more extensive cases, however, the member would carry the message back to the parent organization, discuss the details with those responsible for resolving the matter, and follow up on the corrective activities until the basic need was satisfied to the satisfaction of the Action Team. This arrangement would provide the capability to develop improvements, as might be identified later on, with only an occasional need to invite others to join directly in the deliberations of the Action Team. It was also desired to keep the size of each Action Team from growing too large. About 15 people was set as the maximum number, with 10 to 12 as the preferred range. The initial composition of the two Action Teams was as follows:
(* = white-collar)

Electrical Action Team -

* Electrical Engineering Section Head
* Electrical Engineering Staff Member
* Electrical Engineering Staff Member
* Material Control Group Member
* Planning Supervisor
* Planning Group Member
  Electrical Superintendent
  Electrical General Supervisor
* Facilitator (Human Resources Group)
* Task Director

Structural Action Team -

* Hull Engineering Supervisor
* Hull Draftsman/Designer
* Material Identification Group Member
* Planning Supervisor
* Planning Group Member
* Materials Management Representative (Purchasing)
  Shipfitting Superintendent
  Shipfitting General Supervisor
  Shipfitting General Supervisor
  Shipwright General Supervisor
* Facilitator (Accuracy Control Group)
* Task Director

It is important to recount the process of selection Action Team members There was absolutely no attempt to exclude an individual because of an ominous personal attitude or expressed opinions. On the contrary, every potential member was assessed *on* the basis of position in the shipyard, assigned responsibilities, and ability to influence the activities of others. This resulted in the creation of Action Teams representing the true life blood of the shipyard at the operational level, with members who should be able to handle the down-stream improvements when they became apparent.

Final selection of the Action Team members received the approbation of senior management in each case. Then, and only then, was the information on Action Team members made known to the personnel involved, and to their immediate supervision.

Meetings of each Action Team were established as once-a-week, for a duration of not more than *one* hour. Unfinished business was carried over until the following week. This arrangement established a known commitment of time for each attendee, minimizing the disruptive effect on other activities. Meeting minutes were kept, and an agenda was published *prior* to the following meeting. The atmosphere during the meetings was kept informal, but control

of the discussions was exercised by the facilitator or the task director until their involvement could be lessened, and later eliminated.

Implementation of Action Teams

Both Action Teams followed the same pattern for the first three meetings, as follows:

Meetings No. 1. A kickoff meeting, where the purpose of the Action Team was explained, the meeting set-up was described, and the members began to interact with one another. This initial experience was tense, with considerable apprehension noticeable among the members. Their contributions to the general discussion were minimal and guarded, with several members clearly relieved when the meeting was adjourned.

Meeting No. 2. A brainstorming session, where problems of every description were brought up under carefully controlled general rules. These rules were as follows.

- Each member could bring up only one item at a time.
- The turn would then pass to the next member, moving around the table until everyone had run out of problems (or the meeting time had run out).
- No member could make any comment on another member's item when it was brought up, pro or con.
- Every item would receive equal consideration.

a An existing item could be modified or clarified by another member when his turn came, but the original item would stay the same.

Following this format, and with two facilitators writing down the items two flip charts, the Electrical Action Team generated 66 items, and the Structural Action Team generated 99 items, each in the space of ONE HOUR.

Member attitudes during these second meetings were essentially unchanged from the first ones. The atmosphere was still heavy, with member participation only as required. These sessions were designed to get each of the members to express, but not discuss, items of common interest, which would continue the process of getting the members to feel more comfortable just being in each other's presence. Progress in this regard was slow, but in the right direction.

Meeting No. 3. A categorization session, where each of the problem items brought up were assigned to one of 12 categories. Once each item had been assigned to a category to the satisfaction of all members, a VOTE (using Nominal Group Technique) was conducted to see which category should be pursued further as the highest priority concern of the members. Results were as follows.

For the Electrical Action Team, Material-.Identification was the big winner. This reflected the dire and continuing need for improvements in the timeliness and quality of electrical material deliveries to the work site.

For the Structural Action Team, Material Availability and Communications came in as a tie. It was therefore agreed to discuss both items, which probably had a common thread anyway.

These sessions began the process of developing positive interaction among the members. Member attitudes and participation during these third sessions were improving, with a noticeable decrease in atmospheric tension. Some apprehension remained, particularly in regard to whether any improvements could realistically be achieved despite the need for them. Generally, however, barriers were beginning to break down and the future looked more promising.

Meetings Nos. 4 through 6. These were working sessions where individual concerns within a previously selected category were discussed. By the end of Meeting No. 6, open exchanges were taking place among the members, and several possible avenues of resolution *were* being explored for the main items on the agenda. The facilitators were active in controlling the discussions, but the need for their involvement was beginning to decrease.

Meeting No. 7. For both Action Teams this meeting included the development and acceptance of a Mission Statement, and the selection of an Executive Sponsor. Now the two Action Teams were getting formally established within the shipyard framework for this type of group. Both Action Teams decided to elect, at the next meeting, a Chairman and a Note Taker from among their members. A volunteer Note Taker emerged on the Electrical Action Team, and was promptly accepted by the group.

Meeting No. 8. This meeting saw the election of a Chairman within each Action Team. and also the election of a Note Taker-for the Structural Action Team. The role of the facilitators was now reduced to the point that each Action Team was essentially running by itself as directed by the Chairman.

Meetings Nos. 9 through 24. For both Action Teams, these meetings addressed a regular pattern of items, with different specifics in each functional area but with similar types of agenda items. Both Action Teams treated two generic types of problems: 1) short-range problems within the resolution capability of the Action Team members; and 2) larger and longer-ranged problems that required the involvement of others outside of the Action Team members. A few specific items are described below.

Summary of Action Team Activities

A few of the specific items accomplished by the two Action Teams are as follows.

Electrical Action Team. The principal thrust of several meetings was concern about electrical material identification and availability information. The members were distantly aware of an in-house white-collar effort to improve overall shipyard operations through a technique called Integrated Business Systems (IBS). A modeling technique (IDEF) was being used by the IBS Group to capture the as-is situation for later use in developing the to-be arrangement. In the material area, three specific items were being treated by the IBS Group: the Material Ordering System; the Material Management System; and the computerized Bill of Material. These three items were of special interest to the EAT members, several of whom were regular users of this information.

Several meetings were therefore devoted to articulating particular concerns in these three material system areas for later transmission to the IBS Group for their consideration. The intent was to provide the IBS Group with first-hand user concerns and suggestions that might prove beneficial during the deliberations of the IBS Group. Eight separate and specific items of concern were generated, developed, and carefully described by the EAT. A decision was then made to send these descriptions to the IBS Group, along with an invitation for representatives of the IBS Group to attend an upcoming EAT meeting where two-way communications about these items could be carried out. The invitation was accepted by the IBS Group, and an excellent exchange of information was held at the next EAT meeting (#19). The atmosphere was positive and enthusiastic on both sides, with the expectation that future modifications to these three material systems would reflect the information exchanged. This will clearly enable an improvement in white-collar productivity to the benefit of the *user* community.

During subsequent discussions, the IBS Group decided to seek the agreement of the EAT to be the window into the electrical area through which IBS ideas and intentions might be initially presented sometime in the near future. Following such a presentation, these items might be discussed so as to provide feedback to the IBS Group on how these initiatives might work out in actual usage. Furthermore, the TBS Group voiced their support for similar additional windows through the creation of Action Teams in other functional areas. Clearly, this posture constituted a strong endorsement of the value gained by the white-collar segment from the information exchanges that took place through the EAT.

In another specific area, the EAT members addressed the contractual requirement for calibrating meters in electrical panels. Practice had been to remove the meters from the panels, transport them to the shipyard calibration laboratory for calibration verification, transport them back to the ship, and reinstall them into the panels. This practice was time consuming, costly, and fraught with opportunities for meter damage. Several shipyard support people were invited to attend an EAT meeting to discuss the possibility of in-place calibration verification of panel meters, a practice that would require some equipment purchase and training, but which would potentially save the shipyard a substantial amount of time and money. As a direct result of the EAT involvement in this matter, a procedure for in-place calibration verification of meters in electrical panels was established through the cooperative efforts of people in engineering, material procurement, quality assurance, and production. Once again, a white-collar product was better able to satisfy the overall interests of the shipyard because of the communications provided through the EAT. Working relationships were strengthened through the cooperative discussions that took place, and enough money will be saved by this one item alone to pay for all of the EAT meetings held during this project.

Structural Action Team. A major thrust of the SAT was to investigate the cause of time-consuming problems in the flow of small fabricated wood parts for the minesweepers (MCM). The internal information system covering these parts would show that fabrication of certain parts was complete, but when the downstream installing shop would try to draw these parts out for installation, they were not available in the warehouse or in the fabrication shop. Delays were commonly encountered while a search was made for the supposedly available parts.

A flow chart was made to show every step in the laminating and fabricating

process. Representatives from these two shops were invited to attend the SAT meetings so that agreement might be obtained on the details. Despite several tries at improvements, and at least one substantial change in the software for the information system, the problems persisted. Finally, one seemingly small step was found to be missing from the flow chart, and this step turned out to be the key to establishing when a part was truly completed. Once this point was brought to light, the communication problem that had plagued this particular area on every MCM constructed over the past several years was now resolved. The savings in installation shop man-hours through drastic reductions in parts chasing activities will be several times greater than the cost of all of the SAT meetings held during this project. The white-collar product that was improved in this case was a computerized tracking system, now adjusted to reflect the true status of the parts being tracked.

This particular problem endorses the importance of having a process flow chart that covers ALL aspects of an operation. Such a complete flow chart discloses four types of activities:

Type 1 - part of the process + value added to the final product;

Type 2 - part of the process + no value added to the final product;

Type 3 - not part of the process + value added to the final product;

Type 4 - not part of the process + *no* value added to the final product.

Careful examination of each activity on the process flow chart will disclose the exact nature of that activity (Type 1, 2, 3, or 4). This will promptly reveal those activities that are candidates for modification, or even outright elimination. It may even be the activities that are not a part of the basic process that are causing the problems in the first place.

One other regular feature of the SAT meetings was a brief presentation by the SAT members from the shipyard engineering group on what directions were going to be issued to production in the immediate future. At first the only information volunteered was for those items that had been fully researched and were considered firm by engineering. That is, there was no discussion of items that were indefinite and still under technical consideration. As the meetings progressed, the working relationships among the SAT members became closer and less uncertain, and confidence grew among the members. Then the engineering members were more Willing to volunteer information even if it was still under development. This produced a virtual breakthrough in communications (at about meeting #19), which allowed the regular discussion of potential problems to take place at each subsequent meeting. Although the effect on white-collar productivity of these more open discussions was not quantifiable, there is no doubt that the benefits are large and in the right direction.

Attitude Changes

The appearance of changes in the baseline indicators selected for measuring improvement in white-collar productivity did not materialize as soon as was expected, with one exception. That exception was the general attitudes exhibited by the various participants. Within the Action Teams membership, noticeable changes in personal attitudes were seen as early as the 5th or 6th meetings, with major changes apparent by about the 9th or 10th meetings (that is, after the meetings had been running for about three months). Thereafter, steady improvements were seen, with positive working relationships continuing to develop among the Action Team members.

Outside of the Action Team members themselves, changes in the attitudes of those interfacing with the Action Teams were seen shortly after these invites had participated in the meetings. First among this segment was the IBS Group, whose prompt reaction was to endorse the EAT as a way for IBS efforts to be introduced into the shipyard processes, and from which feedback on implementation of these ideas might be gained. In addition, the IBS Group quickly supported the potential for establishing similar Action Teams in the other functional areas of the shipyard, so that the same advantages might be gained in those areas also.

The attitudes of senior shipyard managers followed a similar vein. These senior managers (identified earlier) were briefed on a continuing basis. As the end of the project drew near, the task director raised the possibility of abandoning the Action Teams, since they were no longer needed to support the project. The consensus of the senior managers, however, was that the two Action Teams already in place should continue to operate. Since these two Action Teams had been institutionalized (during the 7th meetings), having them continue in operation would not require any additional or special action. This senior level of management also indicated that consideration would be given to setting up similar Action Teams in the other functional areas of the shipyard. To date this action has not been taken because of an unfavorable workload.

Specific Baseline Indicators

In regard to the other baseline indicators selected for this Task, the following observations apply.

The population of Production Change Requests (PCR's) appeared to be unchanged during the performance period of this project. The PCR system itself continued to be supported in some areas and not in others, apparently unaffected by activities of the two Action Teams.

The situation surrounding Engineering Change Notices (ECN's) was somewhat different, since these items were now being discussed freely during the SAT meetings. To the extent that this noticeable improvement in information exchange was taking place, the ECN system was gaining credibility. However, the number and nature of ECN's showed no significant change.

The mobility of the engineering people, along with white-collar material people and planning personnel, seemed to show more activity due to the Action Teams, but definitive data to support that observation was not available. Similarly, visits and discussions by blue-collar workers with their white-collar counterparts seemed to be more prevalent as the end of the project performance period was reached, but firm data to support this condition was not in evidence.

Questionnaire Results

After the Action Teams had operated over a period of 6 months, each Action Team member was asked to fill out a questionnaire to provide some insight into how this project had proceeded. Although this information sample of 15 replies, 5 from production members and 10 from white-collar members, was too small to be statistically sound, the results were interesting.

93% felt that meeting for 1 hour per week was about right.

80% of the production members felt that engineering (and other white-collar) matters were the best topics discussed.

44% of white-collar members felt that the best topics discussed were those that could be resolved by the Action Team members. One white-collar respondent stated that ALL topics discussed were important.

66% felt that problems beyond the capability of the Action Team members to resolve were the worst topics discussed. However, 2 respondents stated that there was NO worst topic discussed.

The EAT/SAT was value rated by all respondents at 6.9 (on a scale of 1 to 10 (high)). However, the production members value rated the EAT/SAT at 7.8.

73% felt that white-collar productivity had stayed the same during the 6-month period of EAT/SAT operation. One respondent added that 6 months was too short a time period to reveal any major improvements. 40% of production members, but only 20% of white-collar members, felt that white-collar productivity had improved during the 6 month period of EAT/SAT operations. No respondent indicated that white-collar productivity had dropped.

80% supported the idea of Action Teams in other functional areas.

93% felt that better cross-functional communication was needed.

Termination of Phase I

At this point it was decided not to wait any longer for the baseline productivity indicators to change. The 12-month performance period of this task was exhausted. In view of the fact that Phase II of this task would be performed at the same location with little or no interruption in activities, it was decided to continue tracking the results of these two single-function Action Teams into Phase II. This would provide additional opportunity for these indicators to show changes which may reflect on the nature and magnitude of white-collar productivity.

APPLICATION OF FINDINGS

The results of this Task have demonstrated that white-collar productivity in a shipyard environment can be treated effectively with the Action Team technique. From-the lessons learned during Phase I, the following guidelines are suggested for use by other shipyards interested in developing this approach.

Step 1: Gain the Confidence of Most Senior Shipyard Management

This action is clearly the most important to a successful operation. This level of management must be kept in close touch with the activities of each Action Team on a frequent and regular basis. The amount of time needed to effect changes in the attitudes of the workers must have up-front recognition and acceptance, because it is not an overnight evolution. Attempts at short-cuts, particularly in the early going, can devastate the fragile balance being nurtured among the participants, and send progress back to square one. In

addition, the subject matter selected for discussion at the Action Team meetings must be selected by the members themselves. They must feel empowered to control their own destiny in regard to the topics being treated. Senior management needs to know what is going on at the meetings, but must resist the temptation to get directly involved.

step2: Recognize the Need to Involve Production Workers

As users of the white-collar product, production workers hold two important keys to achieving success:

(1) detailed and up-to-date information on actual performance of the many procedures and operations that will create the shipyard product, which information is essential to the original development of a good white-collar product; and

(2) information on how well (or how poorly) the white-collar product is actually supporting the various production activities, which information forms the valuable feedback needed by the white-collar faction to truly improve their contribution to the total effort.

Failure to recognize and treat the full scope of white-collar impact may result in improving the quantity and timeliness of the white-collar products, while ignoring the actual usability of them. Such an oversight could make matters even worse by more fully masking the real cause of shipyard difficulties.

Step 3: Assess Initial Conditions within the Shipyard

A series of l-hour interviews with selected workers will provide a suitable profile of existing relationships among the groups involved, and will also generate information on training and operational capabilities upon which to build the overall effort. It is important to recognize that deliberate interviews of this type should be conducted, even though current information appears to be already in hand. It takes only a short while to conduct the interviews, and when properly done they can reveal a wealth of information on how things are perceived by the workers themselves. Recent attention to the idea of Action Teams is quite extensive throughout the shipyard community. This approach will therefore find familiarity in most locations.

Step 4: Establish Baseline Productivity Indicators

Even though this step fell short of the mark during Phase I of this project, the need to carry it out was not diminished. Several indicators should be selected and measured to provide the starting points for later assessments of white-collar productivity. Once established, these baselines should not be changed as developments occur, but rather should remain as stable reference points against which to assess progress.

Step 5: Select the Functional Area(s) to be Treated

In most cases, this determination will be straightforward. The smaller the area, the better the chances of success (at least initially). In a large shipyard, the area to be treated may be limited by the sheer numbers of workers involved (both white-collar and blue-collar). The composition of the Action Team should include enough workers to permit reasonable discussion of the problem area, while staying at about 12 to 15 total people. If the area selected for treatment turns out to be too large to handle, the scope of the function should be reduced until a reasonable accommodation is reached. In the smaller shipyard, treating a full function should not be a problem.

Step 6: Create the Action Team(s)

The members of each Action Team should be selected carefully. Individuals who have a good grasp on their own activities, and show evidence of ability to influence others, will be good choices. The total team membership should encompass nearly all aspects of the functional area to be treated. Prospective members should not be rejected because they are too busy, or too noisy, or too difficult to control. Selection criteria should include the capability to communicate, the ability to recognize that changes are both needed and are usually difficult to achieve, and the probability that the candidate will ultimately make a meaningful contribution to the team. Selections should not be announced until senior management has been made aware of them, and the supervisors affected have voiced their agreement.

Step 7: Implement the Action Team(s)

Limit the Action Team meeting duration to one hour per week, preferably at the same convenient location so that the members will become familiar with the surroundings. The use of a facilitator is recommended, someone who has no particular vested interest in specific topics, but rather someone who will keep conversations alive and member interest up. Do not try to hurry the process along, at least initially. Time is a tool to be applied carefully in first developing a viable communications network among the participants, and then in creating a strong working relation-

ship that will withstand the unrelenting and always urgent demands of the workplace. Once these two attributes are firmly established, perhaps three to four months downstream, the time element will become less sensitive, and more latitude will be available for adjusting Action Team meeting dates and durations. Early agenda items should be designed for team building rather than for treating specific subjects. After a few meetings, the team should select a Chairperson and Recorder from within their ranks, so that eventually the role of the facilitator can be reduced or eliminated. These duties can be rotated on a reasonable basis (several months) if desired. Each meeting should have a printed agenda, and meeting minutes should be kept and published to the members.

Step 8: Assess the Value of the Action Team(s)

After an Action Team has been in operation for several months, a deliberate assessment should be made to help in deciding whether or not the Action Team should stay in operation, and whether any membership adjustments should be made. If advantages are accruing based on the perspective of the Action Team members or on management assessments, and there are a reasonable number of concrete results in evidence, then continuation is indicated. Otherwise, it may be better to abandon the team, recognizing that it will suffer some startup problems if it is reinstated later on. Changing one or two of the team members may strengthen the overall effort, and invigorate the remaining team members to new heights of achievement.

The effectiveness of this step will be improved if management focus is maintained on the TEAM rather than on the projects being treated by the team. There is, of course, a continuing need for feedback to management on team activities, and there may be an occasional need for management follow-up on a specific item. Generally, however, the team will continue to function effectively once the members can see their own successes, and realize that they have been empowered to make the necessary changes by themselves. The management role becomes one of supporting the TEAM, and allowing it to operate as a cooperative entity. This is also a good time to evaluate whether additional teams in other functional areas might be helpful, recognizing that the startup times for the new teams must be accommodated.

OVERALL ASSESSMENT OF RESULTS

Performance of this project produced results that were better than anticipated. The Action Teams that were established, one electrical and one structural, both functioned extremely well. The Action Teams demonstrated that favorable worker attitudes and working relationships can be strengthened through employee involvement techniques. Several instances of white-collar improvements were seen, with more developing almost daily. Three segments of the white-collar community at PBI - as it applies to these two specific functions - were treated: material support, planning, and engineering. All three segments were responsive, and show promise of continuing improvements.

After Phase I, the attitude among the senior shipyard managers was to continue the two Action Teams beyond the end of the project, and also to promote the idea of establishing more Action Teams in other functional areas of the shipyard. Such intentions clearly endorse the advantages gained from this approach.

Other shipyards should consider the establishment of Action Teams, following the guidelines above. An additional inducement to try this approach will be found in the success achieved at General Dynamics Corporation/Electric Boat Division through the use of Union Driven Safety Action Teams (1). The composition of the Action Teams at GD/EB was similar, although the focus was on safety rather than on white-collar productivity. Nevertheless, the Action Team approach can be a versatile tool in the shipyard improvement arsenal.

WHAT HAPPENS NEXT?

During this project little, if any, regular and deliberate inter-functional communications were apparent. This symptom is common to many shipyards, where cross-functional communications are usually weak at best, and may be missing entirely until forced by inopportune production interferences and sequencing problems that occur downstream. Improvements in this area are needed to create new opportunities for the white-collar product to better match the needs of the overall production effort, while avoiding costly impacts during the construction period.

Phase II of this project has been addressing this problem area for several months, investigating and developing innovations for cross-functional communications as a logical extension of the first project. It has expanded upon the Action Team approach proven successful during Phase I, with a focus on the shipyard engineering group where cross-functional improvements probably should originate. A multi-functional Action Team has been organized and allowed to operate for several months. It is

composed of white-collar and blue-collar representatives from the three main functional areas: electrical; structural; and piping. This team has been addressing ways to establish and develop inter-functional improvements at the operational level before inter-trade problems arise. Although the results of this effort were not available in time to be printed here, they will be discussed informally during the presentation of this paper at the Symposium in September 1992.

EPILOGUE

The concepts of team building and employee empowerment were not entirely unknown in October 1989 when this project was conceived, but first-hand experience with these ideas, and the associated reference material available at that time, were both minimal. This project therefore proceeded on the basis of good judgment, coupled with the rather basic belief that both white-collar people and blue-collar people are capable, that they understand their own areas better than anyone else, and that they will contribute beyond expectations if only they are made aware of what is needed. They form the very core of our shipyard community, and nearly EVERY ONE of them truly wants to help the others improve. During the past three years these ideas have been developed and strengthened throughout the industry. The experience gained through this project, coupled with the growing availability of excellent references on this subject, should inspire more attempts at narrowing the communications gap.

At the 1991 Ship Production Symposium, a superb paper was offered by James Rogness (2). It challenges the shipyard community to consider a revolutionary approach toward breaking the chains of tradition and fantasy which constrain attempts at improving productivity. His paper presents a strong case for unlocking the capabilities of workers at virtually every level in the shipyard. Although the attempt at improving white-collar productivity presented here has not broken those chains decisively, perhaps it has created an interdendritic separation in the base metal that will propagate with usage and create a weakening of those bonds sufficient to qualify these ideas as a herald for future achievements.

References

(1) "Employee Involvement/Safety," NSRP Report 0301, June, 1990.

(2) J. Rogness. "Breaking the Chains of Tradition and Fantasy - A Revolutionary Approach to the Constraints of Productivity*', Ship Production Symposium, 1991.