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DEVELOPING A BATTALION INFORMATION ARCHITECTURE

BY

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USAWC Military Studies Program Paper

DEVELOPING A BATTALION INFORMATION ARCHITECTURE

Individual Essay

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12 March 1986

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ABSTRACT

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DEVELOPING A BATTALION INFORMATION ARCHITECTURE

"I am convinced that leaders of this battalion are capable of doing a much better job of managing resources than our recent performance indicates," said the battalion commander, LTC Brown. Others at the weekly command and staff meeting glanced nervously at each other wondering what their new commander had on his mind.

He continued, "I'll bet each of you has the same problems I have in trying to get information for what seem like simple decisions. I know the data is available somewhere in the battalion, but it is usually not where I want it or not in a form useful to me. Our filing cabinets are overflowing and we have literally mounds of papers filling our in-boxes, but we don't have a good handle on the information we need for doing business. We often waste soldiers' and leaders' time with duplicative efforts chasing down the same bits of data for similar decisions when that information would easily be obtainable if we understood the concept of a corporate data base. It bothers me to see company commanders and first sergeants either chasing information or feeling tied to their desks instead of using quality time to train soldiers."

The S3 squirmed in his seat thinking of the amount of company commander time he had consumed the previous week preparing the exercise OPORD for the upcoming brigade training exercise. Had he had better information about equipment and personnel readiness of the different companies, he could have easily prepared the OPORD without requiring another meeting.

At the same time, the S4 was reminded of the scramble he and the company supply sergeants had just finished to reconcile the battalion property book with handreceipts for all the vehicles in the battalion. "If we only had an easy way of crosschecking the property book and handreceipts," he thought.

The commander continued, "Each of us is a leader, but we should also be

responsible managers or stewards of resources entrusted to us. There is much we can learn from business and well managed military units that have learned to exploit modern techniques and technology to improve information support to decision making. I want this battalion to begin to learn these lessons and do a better job of managing our information resource."

LTC Brown recognized that his battalion was suffering from information problems common to many tactical units. While the doctrinal literature did a decent job of identifying information needs in a tactical setting, it offered little support in the area of information support to routine garrison decision making. Ideally, the wartime information system should be the one used during peacetime in the garrison environment. Realistically, decisions were similar in the garrison and tactical environments, but information flows were different. In garrison, the division and brigade commanders expected certain items of information, such as budget data, to be readily available by the battalion leaders. It seemed to LTC Brown that too often the division staff had better access to information about the battalion than did members of the unit itself. A comprehensive look at the garrison information needs of the battalion was needed.

LTC Brown reflected that information needs had been mentioned by the division commander and had been a familiar theme of other commanders. In his orientation visit with the division IG, this former battalion commander had observed that units with good information systems tended to be both well managed and well led. The IG and other commanders remarked that making long term fixes on the unit's information systems took careful planning but paid great dividends.

Attempts by some to implement long term improvements were frustrated by the chronic problems of personnel turbulence, reorganizations and changing emphasis by higher headquarters. New people were always coming into the

organization causing training on the unit information system to be a continuous process. Likewise, organizational changes often changed information flows. Frustration was also expressed with the changing requirements for information by higher headquarters, although this was seen as part of the need to have a good handle on the battalion's own internal information system.

On the positive side, LTC Brown was pleased to discover that the battalion had obviously been managed by objectives which were clearly stated for leaders at all levels. Progress toward these objectives was usually measured based on information gathered through personal observations of the more experienced leaders. For example, observed performance of platoons in accomplishing ARTEP tasks was the key means of assessing wartime readiness and identifying training deficiencies. Unfortunately, junior leaders were less able to spot systemic problems due to their inexperience. They generally lacked an appreciation for the way the rest of the battalion operated. An effective means of relating objectives to decision making information needs was needed to assist junior leaders to overcome this experience gap.

The battalion commander's attention was brought back to the meeting by CPT Sparks, the battalion communications-electronics staff officer, who said, "We really are in the stone age in information technology compared to many businesses. The only pieces of modern information technology we have in the battalion are the word processor, which runs almost 24 hours a day, and a reproduction capability that is usually broken. One first sergeant has become so frustrated redoing lists and other routine correspondence that he brought his personal computer into the orderly room. It has virtually replaced the typewriter in that company. I am sure the first sergeants could quickly identify a dozen microcomputer applications that would significantly improve both company and battalion administrative efficiency. We have gone beyond the

need for one word processor at battalion level. Each company and staff section could use a microcomputer, especially one linked into a battalion system. It would save us hours of time and improve support to the soldiers."

"Help is already on the way," spoke up the S4. "The September 1985 issue of Army magazine had an article about the Army's tests of the Tactical Army Combat Service Support Computer System (TACCS) for battalion and company use. We should find out how this system works to improve information efficiency in the areas of supply, personnel, maintenance, communications security, and property accountability before we go off half-cocked and reinvent the wheel."

"The point is," exclaimed CPT Sparks, "Soldiers of this battalion are well aware of the advantages of computers because many of them already own personal computers in their homes. If businesses can improve productivity and management effectiveness by treating information as a resource, we can too. We should prepare ourselves to capitalize on the technology without waiting for someone else to fix the problems for us. At least we can identify our own needs."

As the meeting ended, it had become clear to LTC Brown that the unit needed a simple but comprehensive way of portraying the battalion's overall information architecture. This architecture must be easy to understand, oriented to the decision makers of the battalion, and should serve as a blueprint for how information ought to flow throughout the battalion regardless of personalities or organizational changes. It should orient on the decision processes and information needed to make these decisions, and it should clearly depict how data should be shared among the different decision processes. Such an "ideal" information system could also be used to evaluate the current system and determine where fixes are needed to improve support to decision makers.

The following morning, the battalion commander met with the XO and the

communications-electronics staff officer, CPT Sparks, who he planned to designate as project officer for an information needs study of the battalion.

"This installation has recently completed an information needs study using the Business System Planning (BSP) methodology developed by International Business Machines (IBM)", the commander began. "It has been used successfully in hundreds of different businesses and governmental organizations to accomplish essentially what we need to do in this battalion. More importantly, the Director of Information Management (DOIM) on this post is very familiar with the methodology and is willing to assist in any way necessary. CPT Sparks, I want you to lead the study effort to develop a battalion information architecture using the BSP methodology. Become familiar with the methodology and brief us at the next command and staff meeting on how you intend to proceed. This is an important endeavor which will require maximum cooperation by all decision makers within the battalion and you can count on the XO's and my total support."

BEGINNING THE PROJECT

By the next command and staff meeting CPT Sparks had met with the installation DOIM and become familiar with the IBM published Information Systems Planning Guide, which had been used in developing the installation information architecture. He learned that not only had many Army installations used this same methodology, but it had been used by Department of the Army Headquarters and several Major Army Commands.

At the meeting, CPT Sparks explained his project and highlighted the steps to be followed:

- Begin by gaining the commitment of leaders to the objective of an improved information system.
- Develop a thorough understanding of the organization by identifying its objectives, decision processes and data classes.

- Identify who in the unit is involved in the decision process.
- Develop an information architecture which links decision processes and information they create or use.
- Identify information shortfalls and problems.
- Determine needed information system enhancements and priorities.

The battalion commander strongly endorsed the efforts of CPT Sparks and reiterated the importance of this project for the entire battalion. He identified other members of the study team, which included representation from each staff section, a company XO and a former 1st Sergeant. The study team was excused from other duties for a period of three weeks, provided with a work location and assigned a couple of soon-to-PCS soldiers with typing skills to assist with administrative matters. Such an investment in time and talent was considered necessary if any progress was to be expected.

While completely hypothetical, what follows is an account of how the study team proceeded to develop a battalion information architecture using the IBM Business System Planning methodology.

GAINING LEADER COMMITMENT

Following the BSP guidelines, CPT Sparks first ensured the commitment of the leadership of the battalion. If the study were to change the way information flows, it would change the way the battalion did business. It was clear that the study should reflect the way the collective leadership of the battalion saw the unit and the study's success depended upon their participation in providing an understanding of information required for decisions. Approval of any final architecture would commit the unit to a certain direction in the use of information making it important at the beginning to minimize misunderstandings of the leaders who would then have to live with it.

The personal involvement of the battalion commander was strong support to

the project since it not only promoted interest, but significantly increased the likelihood that the resulting plan would have the necessary top-down focus required to support improved decision making. CPT Sparks was a good choice as team leader since he had access to the leaders of the unit and could correctly interpret their inputs. The commander again emphasized his commitment to the project by reiterating the need for all leaders to support CPT Sparks and his study effort. Company commanders and staff officers, while not enthusiastic about giving up key people to man the study team, were openly supportive of the project because it held out hope for more efficient operations.

UNDERSTANDING THE ORGANIZATION

CPT Sparks and his study team began to view the battalion as a set of information processors that create, process and transmit information for the purpose of making decisions. These decisions in turn create additional information to be processed and transmitted. Understanding the battalion organization meant more than examining a line and block chart. It meant determining what decision processes were involved in creating or using data toward the accomplishment of the unit's objectives.

The team began by examining the battalion's objectives. These could be found by looking at the formal objectives stated in the unit's command briefing and by studying the commander's Officer Efficiency Report Support Form (DA FORM 67-8-1). A quick check of the company commanders', command sergeant major's and executive officer's support forms confirmed that their major performance objectives were subordinate to and supporting those of the battalion commander. Later, key leaders would be asked to identify those things that absolutely must go right for them to be successful in their jobs. These "critical success factors" in combination with the objectives of the unit would be useful in deciding the priority of repairs needed to the information system.

As the study team prepared to conduct interviews with the leadership of the battalion, the most time consuming and probably most important activity for them was the identification and definition of decision processes and data classes. These processes and data classes would not only form the basis for the interviews, but they would be used to develop the information architecture, problem analysis and other follow-on activities.

A process was defined as groups of logically related decisions and activities required to manage the resources of the unit. The battalion made decisions regarding the resources of money, people, materiel, real property, time and information. Each resource was examined through its life cycle in the battalion from requirements determination to acquisition to stewardship to retirement to determine what decisions were made within the battalion that required information support. Sixteen processes (Figure 1) were identified.

Likewise, data classes were identified and defined. A data class is a logical grouping of data related to things of lasting interest to the battalion and available for decision making. Eventually, some data classes might be broken into specific data elements for purposes of automation, but for now a general description of information needs would suffice. The data classes were needed in order to examine data sharing requirements, assess data necessary but either unavailable or insufficient for decisions, and to lay the groundwork for fixing data integrity responsibility. During the identification and definition of data classes, there should be one and only one process identified as creating each data class. The study group identified 34 data classes (Figure 1).

Definitions for the Processes are available in Appendix A. Data class definitions are available in Appendix B.

PROCESS	DATA CLASS
1. MANAGE MILITARY PERSONNEL	1. MILITARY PERSONNEL STRENGTH 2. MILITARY PERSONNEL DESCRIPTION 3. MILITARY PERSONNEL ACTIONS
2. COMPLY WITH AND ENFORCE LEGAL REQUIREMENTS	4. LEGAL REQUIREMENTS 5. VIOLATIONS
3. DEVELOP AND IMPLEMENT A QUALITY OF LIFE PROGRAM	6. QUALITY OF LIFE PROGRAM 7. COMMUNITY SUPPORT
4. MANAGE SECURITY PROGRAMS	8. SECURITY PROGRAMS
5. IMPROVE RESOURCE MANAGEMENT	9. MANAGEMENT PROGRAMS 10. INSPECTION RESULTS
6. ESTABLISH COMMAND CLIMATE AND DIRECTION	11. POLICIES AND PROCEDURES
7. MANAGE AND CONVEY INFORMATION	12. COMMUNICATIONS SYSTEMS 13. ADMINISTRATIVE SYSTEMS
8. SHORT TO MID RANGE PLANNING	14. WAR PLANS 15. CONTINGENCY PLANS
9. MANAGE FORCE CAPABILITIES	16. AUTHORIZATIONS (MTOE/OTHER) 17. DEPLOYMENT PLANS
10. DETERMINE TRAINING REQUIREMENTS	18. TRAINING PROGRAM 19. TRAINING ASSETS 20. EXERCISE REQUIREMENTS
11. MANAGE AND CONDUCT TRAINING	21. TRAINING EVALUATIONS
12. SCHEDULE RESOURCES	22. TASKINGS 23. COMMITTED RESOURCES 24. TRAINING SCHEDULE
13. FORMULATE AND MANAGE THE BUDGET	25. BUDGET 26. FUNDS STATUS
14. MANAGE MATERIEL	27. MATERIEL REQUIREMENTS 28. MATERIEL REQUISITION STATUS 29. MATERIEL DESCRIPTION 30. MATERIEL DISTRIBUTION
15. MANAGE MATERIEL MAINTENANCE	31. MAINTENANCE REQUIREMENTS 32. MAINTENANCE ASSETS 33. MAINTENANCE STATUS
16. MANAGE REAL PROPERTY	34. FACILITIES

Figure 1. Battalion Processes and Data Classes

RELATE PROCESSES TO THE ORGANIZATION

Once the business processes had been described, they would be related to the battalion's structure to assist the study team to further clarify their understanding of the processes. The team developed a process/organization matrix (Figure 2) to graphically show who made decisions and who was involved in each of the processes. This matrix helped the team decide who should be interviewed and was authenticated by the interviewees as they discussed their responsibilities in each process.

A quick review of the process/organization matrix shows several instances of overlapping responsibility and decision-making authority for such processes as #1 Managing military personnel or #12 Scheduling resources. In the case of military personnel, the battalion commander had delegated specific personnel assignment decisions to the CSM, S1 and company commanders, but reserved for himself the decisions regarding officers. Likewise, time was scheduled in part by the S3, XO, CSM and company commanders with major scheduling conflicts decided by the battalion commander. The matrix helped identify such potential problem areas to be clarified later during the interviews.

ORGANIZATION

PROCESSES	BN	CO	STAFF							
	CDR	CDR	CSM	XO	S1	S2	S3	S4	CHA	BMO
1. Manage military personnel	X	X	X	M	X	M	/	.	M	.
2. Comply with legal requirements	X	X	.	M	M	M
3. Manage quality of life program	X	X	X	M	M	.	/	/	M	.
4. Manage security programs	/	/	/	/	/	X	/	.	.	.
5. Improve resource management	X	M	M	X	/	.	/	M	.	/
6. Develop command climate	X	M	M	M	M	.	.	.	/	.
7. Convey information	X	M	M	M	M	M	M	/	/	.
8. Conduct planning	X	/	/	M	/	.	M	M	.	.
9. Manage force capabilities	X	M	/	M	M	.	M	M	.	/
10. Determine training requirements	X	X	X	X	/	/	X	.	.	.
11. Manage/conduct training	M	X	M	M	/	/	X	M	.	.
12. Schedule resources	X	X	X	X	/	.	X	M	.	M
13. Formulate/manage budget	X	M	/	X	.	.	M	M	/	.
14. Manage materiel	M	X	.	X	.	.	/	X	.	/
15. Manage materiel maintenance	M	X	.	X	.	.	/	/	.	M
16. Manage real property	M	M	M	X	/	/	.	M	.	.

Legend: X - Decision maker
M - Major involvement
/ - Some involvement
. - No involvement

Figure 2. Process/Organization Matrix

DEVELOP AN INFORMATION ARCHITECTURE

Once the processes and data classes had been identified, the relationships between processes and data classes were established. This could either be done in a flow diagram or, as illustrated in figure 3, a process/data class matrix. When completed, this matrix became the essence of the information architecture or "ideal" information system sought by the unit. It was used as an important analytical tool for verifying data class identification, communicating data sharing concepts, analyzing data problems and determining dependencies between eventual automated applications.

The study team first focused on identifying the process that was the best source or "creator" of each data class. A "best" source implies that the identified process may not necessarily be the "only" source of this data class, but that it is the most logical process for ensuring the availability and integrity of the data for use by the rest of the information system. Within the matrix, the letter "C" designated that one and only one process identified as the creator of the data class. For example, process #10 "Determine training requirements" is identified as the creator of data class #18 "Training program" as indicated by the "C" in the matrix where the process and data class intersect. In a similar manner, each data class is associated with the one process which is the best source for ensuring the integrity of that data class.

In a similar manner, the team identified those processes that would also "use" a data class with the letter "U" in the matrix where the process and data class intersect. Some data classes, such as #11 "Policies and procedures", were expected to be widely used while others are not. The usage of data classes by the overall information system would be essential in planning for data sharing.

PROCESS

DATA CLASS	PROCESS															
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
	MILITARY PERSONNEL	LEGAL RQMNTS	QUALITY OF LIFE	SECURITY PROGRAM	RESOURCE MGMT	COMMAND CLIMATE	CONVEY INFORMATION	PLANNING	FORCE CAPABILITIES	TRAINING RQMNTS	CONDUCT TRAINING	SCHEDULE RESOURCES	BUDGET MGMT	MANAGE MATERIEL	MATERIEL MAINT.	REAL PROPERTY
1 MIL PER STRENGTH	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
2 MIL PER DESCRIPTION	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
3 MIL PER ACTIONS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
4 LEGAL REQUIREMENTS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5 VIOLATIONS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
6 QUALITY OF LIFE	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
7 COMMUNITY SUPPORT	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
8 SECURITY PROGRAMS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
9 MANAGEMENT PROGRAMS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
10 INSPECTION RESULTS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
11 POLICY/PROCEDURES	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
12 COMMO SYSTEMS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
13 ADMIN SYSTEMS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
14 WAR PLANS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
15 CONTINGENCIES	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
16 AUTHORIZATIONS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
17 DEPLOYMENT PLANS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
18 TRAINING PROGRAM	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
19 TRAINING ASSETS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
20 EXERCISE RQMNTS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
21 TRAINING EVALUATION	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
22 TASKINGS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
23 COMMITTED RESOURCES	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
24 TRAINING SCHEDULE	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25 BUDGET	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
26 FUNDS STATUS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
27 MATERIEL RQMNTS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
28 MAT REQUISITION STATUS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
29 MATERIEL DESCRIPTION	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
30 MATERIEL DISTRIBUTION	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
31 MAINTENANCE RQMNTS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
32 MAINTENANCE ASSETS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
33 MAINTENANCE STATUS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
34 FACILITIES	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C

Legend: C - Creates data (Process creates data class)
 U - Uses data (Process uses data class)

Figure 3. Battalion Process/Data Class Matrix

The study team now had the basic tools with which to assess how information was expected to be created and used within the battalion. The process and data class definitions provided direction by focusing on information needed to support important management decisions of the unit. The process/organization matrix clarified who within the organization was involved in each process. The process/data class matrix explained the relationship between decision processes and the information they either created or used. More detailed planning would define in detail the data elements comprising each data class and which processes or data classes should be automated.

During the next several days, the study team verified or modified their process and data class definitions and their entries in the process/data class and process/organization matrices through in-depth structured interviews with key decision makers of the battalion. Throughout the interviews, the focus was on information requirements to measure progress toward battalion objectives and to make decisions. Where possible, information shortfalls were identified. The battalion commander was the final decision maker to be interviewed and the team was able to report to him that they not only felt they thoroughly understood the decision making information requirements of the battalion, but that the leadership of the unit was in general agreement that the information architecture they were proposing was valid.

IDENTIFY INFORMATION SHORTFALLS AND PROBLEMS

The study team realized that reaching agreement on the process/data class and process/organization matrices meant that the battalion would then know where it was trying to go with its information system. What remained to be done was to document how the existing information system functioned, identify the problems that needed fixing, and establish the priority for committing resources to these system enhancements.

The present system consisted of both manual and automated means of

processing information. These were best described by linking them to the data classes that had been identified. It was now necessary to interview the actual information users or creators within the organization to learn in detail how information flowed. To this point, the team had focused on the decision makers and felt they understood what information was needed. The technicians who actually processed the data would add the needed insights into how to improve the format, timeliness, accuracy and availability of the information from both internal and external sources.

During the process of identifying current information system support, a rather lengthy list of problems was identified that became candidates for later enhancement efforts. As an information problem came to light, the team documented it in a "Problem statement and analysis", or single page description of the problem, its impact on decision making and any possible solutions that would improve the situation. These problem statements were organized into the following general categories:

- Objectives. Information shortfalls in measuring attainment of objectives.
- Organization. Structural characteristics that inhibit information flow.
- Measurement and Control. System shortfalls that inhibit access to information needed for day-to-day control.
- Current system support. System shortfalls that are related to the effectiveness of the present architecture.

DETERMINE SYSTEM ENHANCEMENT PRIORITIES

This set of problems would become the basis to determine architectural priorities. The team sorted the problems by the process which caused the problem to provide a direct relationship between the problems and the subsystems of the information architecture established to support a given

process. This linkage between problems and processes allowed the priorities to be set in full consideration of the relative importance of the processes.

Unfortunately, it was too easy to develop a lengthy list of desirable and useful information system enhancements. Many were manual fixes that became apparent by examining the process/data class matrix and data needs of different decision makers. Other fixes were of an automated nature and would require the expenditure of time, talent and money to accomplish. The problem was not in developing the list, but in deciding the priority in which they should be attacked.

The following general criteria were found to be useful in arriving at a prioritized list of enhancement projects:

- Impact on the unit's mission. Linking recommended system improvements to the objectives and critical success factors from the initial interviews helped determine if the effort spent on a particular system fix would payoff with better information support to measuring the attainment of the unit's objectives. For example, the battalion's most important objective was to provide effective combat support (i.e., electronic warfare) to maneuver brigades during training exercises, despite sometimes severe personnel and equipment shortages. The commander and S3 both felt it was important to this mission to be able to quickly organize effective support packages involving assets from three different companies. Needed was an enhancement that would allow rapid identification of personnel and equipment readiness status for use in managing "shortages" of key mission assets. This enhancement clearly would improve process #9 "Manage force capabilities", and would involve more than one data class since #1 "Military personnel strength", #30 "Materiel distribution", and #33 "Maintenance status" might all need to be improved to provide the more responsive information.

- Demand. Information problems identified by the users of the

present system gave a good indication of demand for improvement. For example, the reenlistment NCO complained that he needed more timely data on a soldier's record of educational achievements. This enhancement fell within data class #2 "Military personnel description" and indicated a level of demand for automating this data class.

- Cost versus potential benefits. At this stage, detailed costs estimates were not possible, but some sense of the magnitude of the effort was needed to compare with expected gains in information system efficiency or effectiveness. For example, nearly all decision makers believed that the use of electronic mail throughout the battalion would significantly improve the efficiency of the information system. This obvious benefit came with a substantial cost over the method of hand-carrying floppy discs between micro-computers or relying on meetings, phone calls and papers. A more detailed cost-benefit analysis was necessary before making this a high priority fix.

- The probability of success. When many enhancement projects competed for the same limited resources of time, money and talent, it only made sense to give higher priority to projects with a high probability of success. Enhancements that were manual in nature and well within the capability of the battalion became candidates for early effort. Projects that required extensive outside assistance, especially software development beyond local capability, were delayed.

The study team presented these prospective criteria to the battalion commander for consideration before applying them to the list of needed system enhancements. A decision was made to treat all four equally for purposes of developing a prioritized "project" list. The team then analyzed each project from the perspective of each criterion. This was done through a "Delphi Technique" within the study team by assessing a relative weight to each project for each criterion.

For example, one of the recommended enhancements was to "Make personal computers available to companies." The study team, which by now represented the most knowledgeable "experts" in the battalion regarding the unit's information requirements, was polled using a questionnaire that had leaders rate how well each enhancement met each criteria using a scale of 1 to 10. In this one example, the results were:

- Impact on unit's mission = 4.50. While microcomputers might help free leaders to do a better job of training, the team collectively felt that the company's tactical missions would not be affected by this enhancement and it received a relatively low score.

- Demand = 8.75. Throughout the study effort, this enhancement was often mentioned as a significant improvement in the overall information system. It was a prerequisite for other enhancements such as "electronic mail", and was therefore assessed to have relatively high demand by the study team.

- Cost versus potential benefits = 8.50. The study team was generally in agreement that the purchase of four microprocessors for company use was well worth the cost, considering available competitive prices of different systems and the applications already identified for their use.

- Probability of success = 5.50. Success depended on obtaining funding from sources outside the battalion and there was considerable uncertainty among study team members regarding availability of this support. As a result, the team collectively scored this criterion relatively low.

Since the battalion commander's guidance was to weight each criterion equally, the four scores for the different criteria were simply added together to obtain an overall prioritization score of 27.25 for this project. In a similar manner, the team computed prioritization scores for all other projects. Using these scores allowed the team to present a prioritized listing of system enhancement projects to the battalion commander.

CONCLUSIONS

In this hypothetical situation, the battalion commander recognized the need to systematically evaluate his unit's information system. Application of the IBM Business System Planning methodology was found to be very useful. Identifying and defining processes and data classes compels the unit to clarify decisions and supporting information needs. Development of a process/organization matrix provides the means for clarifying decision making responsibilities and provides a useful aid for explaining the organization to newcomers or in resolving "turf" battles. Development of a process/data class matrix would help any organization identify data sharing needs and data base integrity responsibilities. In an overall sense, development of all of these tools would define the unit information architecture and would facilitate improved understanding of information requirements, costs and availability.

With an information architecture defining the "ideal" information system, the IBM methodology is a viable means of evaluating the effectiveness of current information system support. Through interviews of both decision makers and information "technicians", attention stays focused on needed improvements in information support to decisions to more nearly match the "ideal" offered by the architecture. These shortcomings can be expressed in terms of recommended improvements that are prioritized according to the carefully developed criteria. The actual implementation of specific enhancement projects could follow this comprehensive study.

Use of the IBM Business System Planning methodology within a battalion organization would result in improved confidence that the resulting plan for implementing information system improvements was sound and viable regardless of subsequent organizational or leadership changes.

APPENDIX A. PROCESS DEFINITIONS

1. Manage military personnel. Decisions regarding the requisition, assignment, evaluation, accounting for, retention and departure of assigned and attached military personnel, and providing them with personnel service support.

2. Comply with and enforce legal requirements. Decisions and activities required, prohibited, or allowed by statutes and regulations to include determining facts, identifying issues, and interpretations to ensure that contemplated actions are legally and regulatorily proper and correct.

3. Develop and implement a quality of life program. Decisions and activities associated with providing a healthy, supportive, friendly, and secure environment for army families in the unit.

4. Manage security programs. Decisions and activities to establish and comply with internal controls to provide for document, personnel and physical security.

5. Improve resource management. Decisions and activities to enhance management efficiency and effectiveness to include evaluations, inspections, measurements, surveys and other forms of gathering, analyzing, comparing and improving management procedures.

6. Establish command climate and direction. Decisions and activities to provide direction for the unit in establishing command philosophy, ethics, values, goals, and public relations.

7. Manage and convey information. Decisions and activities to communicate, receive, secure, categorize, process, edit, store, retrieve, disseminate, and dispose of information.

8. Medium to short range planning. Determining requirements for and use of resources for 1-4 years into the future to include operational planning for wartime and contingency events.

9. Manage force capabilities. Decisions relating to the ability of the unit to accomplish current and future missions.

10. Determine training requirements. The analysis of missions, tasks and force modernization events to determine training needs.

11. Manage and conduct training. Decisions relating to the planning for training to be conducted by units and individuals and the actual conduct and evaluation of training events.

12. Schedule resources. Decisions and activities regarding the indentification, assignment, and monitoring of tasking requirements for manpower, materiel, or organizations.

13. Formulate and manage the budget. Decisions related to the development and submission of a command operating budget, control of expenditures throughout the budget year, and status of funds.

14. Manage materiel. Decisions and activities related to determining requirements for equipment and supplies and compliance with established controls to ensure accountability and efficient/effective utilization.

15. Manage materiel maintenance. Decisions and activities associated with establishment of and compliance with internal controls to ensure that materiel is effectively and efficiently maintained in a mission capable status.

16. Manage real property. Decisions and activities related to internal controls to provide for the effective and efficient utilization of facilities.

APPENDIX B. DATA CLASS DEFINITIONS

1. **Military Personnel Strength.** Information concerning the levels of manpower required to accomplish current and future missions, support current and future force structure documents, and fill other requirements. It includes how many, when, where, skills needed, PCS and ETS loss projections, reenlistment program and objectives, unprogrammed losses, and personnel requisitions and their status.
2. **Military Personnel Description.** Information concerning individual soldiers to include name, rank, date of rank, SSN, date of birth, MOS, length of service, marital status, dependents, education, ASI, SQI, secondary MOS, unit of assignment, religion and blood type.
3. **Military Personnel Actions.** Those activities and decisions associated with the inprocessing, assignment, career development, equal opportunity, recognition, promotions, evaluation, records maintenance, reassignment, separation, or retirement as related to the individual soldier.
4. **Legal Requirements.** Information pertaining to statutes, laws, and regulations governing the unit.
5. **Legal Violations.** Information pertaining to alleged offenses against laws (federal, state and local statutes or ordinances), UCMJ, regulations and policies which may or may not result in formal charges by military or civilian authority against members of the unit or their dependents. Interim and final dispositions include dismissal of charges, conviction, and appeal processes until a case is closed by military authority.
6. **Quality of Life Program.** Information pertaining to the planned program designed to provide a healthy, supportive, friendly, secure and efficient community for the units' Army families. Includes descriptions of services

available, survey results, shortcomings, and status of improvement actions.

7. Community Support. Information pertaining to programmed and scheduled activities of interest to unit personnel and community events supported by unit personnel.

8. Security Programs. Information pertaining to personnel, physical, and information security programs of the unit.

9. Management Programs. Information pertaining to all projects, policies and/or activities established or designed to improve or enhance the management effectiveness or efficiency of the unit.

10. Inspection Results. Information pertaining to the external and internal reported results of inspections and audits of all phases of the operation of the unit.

11. Policies and Procedures. Information pertaining to guidelines from higher headquarters and within the unit regarding how the unit will operate.

12. Communication Systems. Information pertaining to the communication systems operating in or in support of the unit. Includes a description of the systems, their capabilities, requirements and utilization.

13. Administrative Systems. Information pertaining to the types of automated and manual systems associated with providing administrative and information management support. Includes correspondence management, records and reports management, meetings management, automated data processing and word processing management, reproduction and distribution management.

14. War Plans. Information pertaining to planning for the unit to support all tactical plans directed by higher headquarters. Includes identification of directed and implied tasks, training, logistics, personnel, intelligence and security requirements, and administrative data regarding planning documents.

15. Contingency Plans. Information pertaining to planning to respond to

natural disasters, civil defense emergency, protection of federal property, civil disturbances, terrorist threats and other unforeseen nontactical events. Includes training requirements, materiel, personnel staffing, and funding as required.

16. Authorizations. Information concerning MACOM authorized allowances in personnel and equipment for the unit. Includes MTOE, TDA, CTA, message, DA publication and other authorization documents.

17. Deployment Plans. Information pertaining to planning, scheduling resources, mission and movement of units and individuals.

18. Training Program. Information pertaining to the listing and adjustment to internally determined training activities.

19. Training Assets. Information on assets used to conduct or facilitate the conduct of training. Includes training areas and ranges, conference facilities, training aids, school catalogs, and ammunition.

20. Exercise Requirements. Information pertaining to unit identification of the type, amount, and required delivery dates of materiel and personnel involved in deployment for an exercise.

21. Training Evaluation. Information pertaining to formal or informal evaluations of the training status of individuals and units.

22. Taskings. Information pertaining to requirements, both internal and external, which will require the tasking of individuals or units for manpower or materiel.

23. Committed Resources. Information pertaining to resources committed to meet tasking requirements for manpower, materiel, or organizations.

24. Training Schedule. Information pertaining to the time and place of scheduled training of organizations within the unit.

25. Budget. Information pertaining to the planned disbursement of operating

funds allocated for current fiscal year (approved operating budget) and funds required that can be allocated for the next fiscal year (command operating budget).

26. Funds Status. Information pertaining to the current status of appropriated and nonappropriated funds available by funding category.

27. Materiel Requirements. Information pertaining to needed materiel that must be requested through the supply system, locally purchased, or leased.

28. Materiel Requisition Status. Information pertaining to expected delivery of repair parts or materiel.

29. Materiel Description. Information pertaining to materiel which identifies its stock number or manufacturer's part number, physical characteristics, and capabilities.

30. Materiel Distribution. Information pertaining to the internal decisions and precedence of the flow of materiel to units to include redistribution.

31. Maintenance Requirements. Information pertaining to the established precedence of maintenance and the scheme for accomplishing the materiel maintenance program.

32. Maintenance Assets. Information pertaining to maintenance assets on hand and projected. Includes historical and current work load capabilities of maintenance facilities.

33. Maintenance Status. Information pertaining to identification of the work, current status, and expected completion date of materiel maintenance work orders.

34. Facilities. Information about the physical characteristics, location, state of repair, utilization and work order status of buildings, structures, and real estate.

END NOTES

1. General John A Wickham, Chief of Staff, US Army, as quoted by LTG Elton in HQ DA WASH DC//DAPE-ZA// message (DTG 051907Z AUG 85), Subject: Leadership vs Management. Quote was from 9 Jul 85 meeting of The Army Committee for Leadership.
2. "Microcomputer System Tested for Battalion, Company Use," Army, September 1985, p.69.
3. Robert J. Theirauf, Systems Analysis and Design of Real Time Management Information Systems, (Englewood Cliffs, NY: Prentice Hall, Inc, 1975) P. 120.
4. Business System Planning, Information Systems Planning Guide, International Business Machines (GE20-0527-3), (White Plains, NY, 1984) Preface.
5. Ibid., pp. 10-13.
6. The battalion information architecture development follows a model used by the author as a member of an installation level information architecture study team at Fort Polk, LA during the period Dec 84 to Jun 85.
7. Op Cit, IBM, p.16.
8. Ibid., p. 29.
9. Ibid., pp. 36-37.
10. Process and data class definitions have been paraphrased from definitions developed by the Fort Polk study team's Phase I Report, May 1985, Annex J (Fort Polk Processes and Definitions) and Annex M (Data Classes and Definitions).
11. Op. Cit., IBM, pp. 33-34.
12. Ibid., p. 39-45.
13. Ibid., pp. 61-62.

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