AD/M MATURITY GRID

07-01-83

Category: **Tools and Techniques**

Subcategory: **Tools and Techniques** - covers the **overall coordinating architec-ture** and **tools** for the identification, evaluation, selection, installation, and coordinated use of AD/M tools and techniques, such as the development center and information center concepts.

Grid Level Descriptions:

0

> **No consistent** understanding of where overall coordinating architecture and tools, for AD/M tools and techniques, are needed or available. If used, they are applied sporadically, with unknown results.

1

> Knowledge and analysis of both the effort and the outcome of fundamental AD/M tasks, shows where overall coordinating architecture and tools, for AD/M tools and techniques, can be most effective. **Recognize need** for con-sistent effort to identify, use, and measure effectiveness of tools and techniques. Measurements may be subjective and isolated.

2

> **Growing set** of overall coordinating architecture and tools, for AD/M tools and techniques, are used on major projects. Needed improvements are identi-fied, developed, and installed, for future projects. There is a specific search for tools and techniques to fill gaps. The development center and information center concepts begin to focus attention on the integration and use of tools and techniques.

3

> The coverage of overall coordinating architecture and tools, for AD/M tools and techniques, is expanded to all projects and period support. Objective measurement and analysis of results provides for **easy and natural selection** of the best AD/M tools and techniques. Development center and information center concepts provide a broad complement of useful, integrated tools.

4

> The overall coordinating architecture and tools, for AD/M tools and tech-niques, are **integrated completely.** The processes and standards and guide-lines are applied almost automatically through use of the tools and techniques. The feedback on completed projects operates to improve the tools and techniques, as it does the processes, standards, and guidelines.

5

Note: **For grid position determination see last paragraph page 2:**
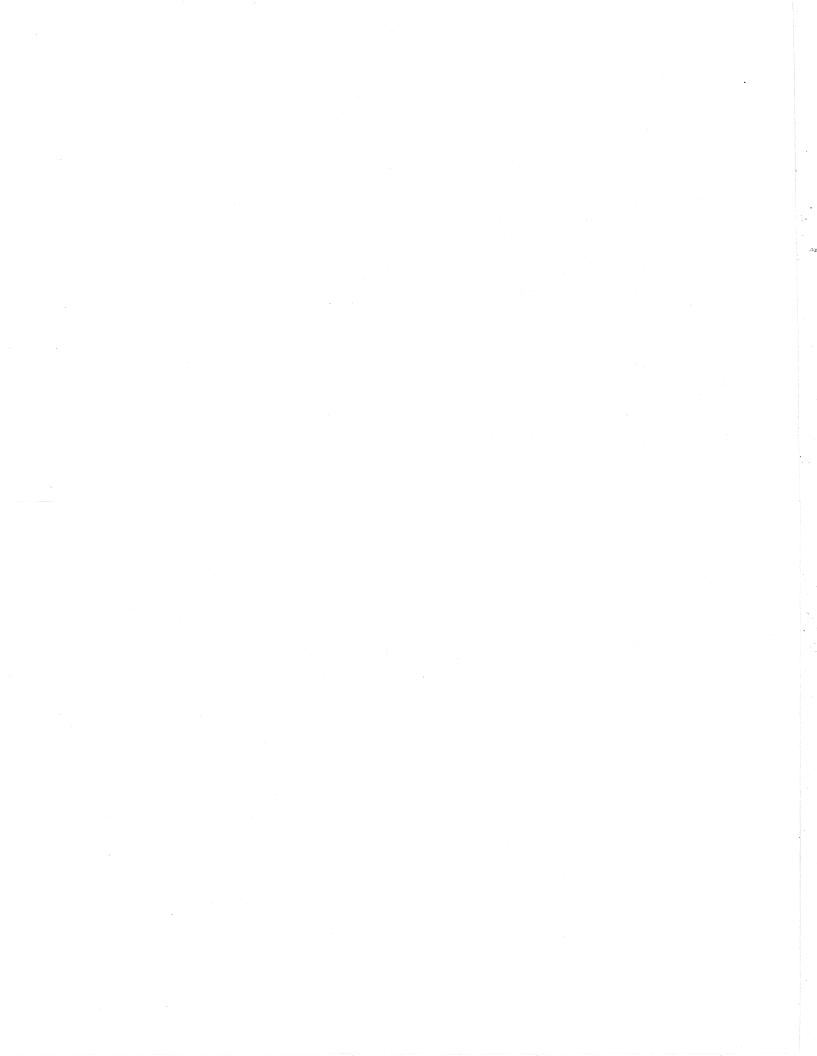
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SESSION REPORT

≡SHARE≡

ABSTRACT

As a result of the critical shortage of qualified systems pro-grammers many installations have considered hiring contract systems programmers or consultants. Rich Schiesser of the Data Service Bureau for the City of Los Angeles and Charles Necker of the Bendix Corporation both have recent experience using systems programmer contractors and consultants. The following are copies of the talks given by both individuals describing these experi-ences.

EXPERIENCES WITH SYSTEMS PROGRAMMER CONTRACTORS & CONSULTANTS

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SHRM-730-1/81

I. INTRODUCTION

The Data Service Bureau of the City of Los Angeles has had recent experience utilizing the services of systems programmer contractors and consultants. This report describes some of the benefits and risks of such services and offers recommendations concerning their use. To illustrate some of the events leading up to these experiences a brief overview of the Data Service Bureau environment is first presented.

A. City of Los Angeles Data Service Bureau

The City of Los Angeles employs over 31,000 employees, operates on an annual budget of $1.7 billion and maintains a bi-weekly payroll of $33 million. The city consists of over 50 major departments and bureaus providing public safety and numerous other citizen services. One of these 50 city agencies is the Data Service Bureau which provides data processing services to all departments within the city as well as to over 60 outside agencies.

The annual budget of the Data Service Bureau is $23 million with a bi-weekly payroll of $350,000 for 340 employees. The primary applications using extensive computer services include public safety, financial, citizen services, business, engineering and office automation. The facilities provided by the Data Service Bureau to support these applications include computer-aided dispatch, message switching, word processing, data entry, online development, online inquiry, data base, computer-based training, and an information center.

B. Operating Environment

The current hardware configuration at the Data Service Bureau consists of a 3081, 3033, 2-4341's, 8100, 6-PDP 11/70's, and 2-11/23's. Disk storage is composed of 8-3380's and 32-3350's shared between the four IBM mainframes. Thirty-two hi-density STC tape drives round out the storage pool. Over 600 remote devices are supported on 8-3705's and some 400 local devices have support from 18-3274's. Three 3814's provide switching for various peripherals and network controllers.

The software currently supported at the Data Service Bureau includes MVS-SP3/JES2, DEC RSX-11M, ACF/VTAM, TSO/ISPF, CICS and IMS. Each of these base packages includes a large family of related products such as MSNF, ISC, Dialog Manager, Session Manager, and the various PARS products. Within the Data Service Bureau are three divisions of Operations, Systems & Programming, and Management Services. The latter provides financial, personnel and administrative services as well as end-user services and technical support. The Technical Support section provides systems programming support, network support and long-range systems planning. In late 1981, with several major projects and migrations beginning to occur at the same time, the Technical Support Section faced a critical shortage of qualified systems programmers.

II. VACANCIES

A. Contributing Factors

Several factors contributed to the large number of vacant positions within the Technical Support Section. One was the rapid rate of growth of both new and existing systems scheduled to be implemented during the same approximate time-frame. Additional positions were authorized to support growth in online law enforcement systems, pilot data base systems, capacity planning efforts, software security, network expansion.

Another factor was the lengthy and structured hiring process of civil service. In order to ensure fair and impartial selection it sometimes took months between a candidate's initial application and his actual hiring date. With other priorities more pressing little effort was put into significantly streamlining this process.

Thirdly, there is an industry-wide shortage of qualified systems programmers. The recent SHARE report from the Software Service Task Force quotes a national systems programming vacancy factor of 17%, in indicating one out of every six positions is currently vacant, with the outlook predicting higher vacancies in the future. During its most critical shortage, the Data Service Bureau had a systems programmer vacancy factor exceeding 35%.

B. Impact

The first impact of the vacancies of systems programmers was that projects were becoming delayed. Those projects requiring new functions within network control software were particularly affected. Another consequence was that not all service levels were being met. As capacity and tuning efforts diminished so also did response times. Finally, there was always the threat of additional vacancies being created if any of the current staff resigned in order to join organizations having fewer vacancies and thus more equitable workloads.

III. ALTERNATIVES

A. Identification

In order to quickly and effectively address the problem of system programmer vacancies several alternatives were identified, evaluated and implemented in varying degrees. While it is not the intent of this session to describe in detail the evaluation and implementation of all of these various alternatives, a brief explanation of those selected for use may prove helpful.

The first alternative was to conduct more aggressive recruiting. This consisted of advertising in major local newspapers, industry trade journals, and various job fairs. Numerous negotiations with our Personnel Department resulted in significantly streamlining the hiring process. Increased participation in national user groups and favorable articles in national newspapers added to our shop's visibility and helped in the recruitment effort. This alternative was used very successfully but by its nature carried with it a lengthy time delay before fully implemented.

Another alternative is to seek out qualified personnel in other sections of the department or, depending upon the enterprise, in other departments of the organization. An individual in an Engineering Department, for example, may have the desire and qualifications to work in some capacity as a systems programmer. Student workers are another group which, with proper background and motivation, may prove to be surprisingly productive in relatively short amounts of time.

In highly specialized cases the use of personal service contracts for ex-employees may be appropriate. The advantage here is the ready availability of qualified personnel for short-term durations. Some disadvantages include leverage in contractual terms and the potential effects on employee morale. Two final alternatives involve the use of systems programmer contractors and/or consultants.

B. Contractor vs. Consultant

Some of the differences between contractors and consultants should be considered before one is hired in order to make the most appropriate use of either. Contract systems programmers are typically oriented toward software internals, have recent detailed technical expertise, and may assume some of the responsibilities of lead systems programmer. A consultant, on the other hand, is more oriented toward conceptual view points and the concerns of management. Certainly there are exceptions to both of these but our experience has found this in general to be the case.

The deliverables provided by contractors are usually in the form of control software installations, migrations, modified control software coding, or maintenance of existing control software. Their approach would be to code, test, document and possibly train.

Consultants more commonly deliver studies, analyses, methodologies, and recommendations. Their approach would be to interview programmers, users and managers, and then to analyze data, processes, and procedures.

In comparing other factors of a contractor vs. consultant a contractor is normally employed longer in a single engagement (6-18 mos vs. 3-6 mos), may have somewhat less experience (3-8 yrs vs. 10-15 yrs), and will likely be less expensive ($40-70/hr vs. $60-200/hr).

These various differences may influence decisions concerning the hiring of contractors vs. consultants, particularly for those projects which may overlap into both areas such as capacity management or office automation products.

IV. EXPERIENCES

A. Chronology

During the period from early 1982 through mid1983 the Technical Support Section of the Data Service Bureau utilized the services of four contract system programmers and one consulting firm. A variety of time-frames, activities, and personalities were involved providing considerable experience in the areas of benefits, risks and recommendations. The following briefly chronologizes these services and experiences.

In the first quarter of 1982 contractor#1 was hired to aid in the management of DASD. At the same time contractor#2 was hired to assist in a performance and capacity planning effort. Both appeared qualified for the tasks. By the second quarter of 1982 it was apparent that a critical need in the CICS area was at the time more pressing than DASD management. Since contractor#1 was both experienced and interested in CICS internals, he was transferred into the CICS group. He has since become a permanent employee and one of our most knowledgeable CICS experts.

Contractor#2 meantime was beginning to struggle with performance and capacity when it went beyond MVS to include CICS and

IMS. His services were ended in the third quarter of 1982. As the concern for CICS performance kept growing contractor#3 was hastily hired in the third quarter of 1982 to install several CICS performance products. While perhaps technically qualified Contractor#3 was not well-suited to engagements of any length and his services were quickly ended in the fourth quarter of 1982.

During the second quarter of 1983 after slightly more careful selection contractor#4 was hired to work on network performance and is currently working out quite well. Also in the second quarter of 1983 consultants were hired to assist in establishing a formal ongoing capacity planning program. They are extremely well-qualified, have had a very positive effect on the staff, and expect to complete their work in the fourth quarter of 1983.

B.   Benefits

One of the primary benefits of utilizing either contract systems programmers or consultants is the timely completion of critically urgent tasks. At the Data Service Bureau several new functions of CICS required for an extensive law enforcement system were installed, tested and implemented by a contractor. Due to the intensely competitive nature of the field highly qualified technical personnel are typically available as was the case here.

Another advantage is that deliverables can have long-term benefit. Studies, analyses, recommendations, procedures, training guides and other forms of documentation can be referenced usefully months or even years beyond their origin.

Less tangible but no less important a benefit are the candid and unbiased observations a contractor or consultant may have on the operations of a shop. This is particularly true when the individuals involved come with a large variety of experiences in shops similar to your own.

Another benefit is that the entire process provides one with new experiences in the areas of recruiting, screening, selection and appraisals. Finally the requirement to clearly define the work environment to an unfamiliar outside party can be beneficial in that it encourages a supervisor to improve the documentation and organization of assignments and responsibilities.

C.   Risks

Contracts which are based solely on time-and-material may result in work which is only partially or inadequately completed. A common example of this is the installation of new software without providing proper training or sufficient

documentation. While not likely to happen as often with consultants it is not an infrequent occurrence with contractors and in fact happened with one of the four contractors employed by the Data Service Bureau.

Another potential risk is that of engaging unqualified personnel. Requesting recent references and thoroughly following up on them tends to minimize this risk since the field is so competitive. On the other hand lengthy and expensive recruiting and screening efforts can sometimes become a financial burden before producing any worthwhile results.

The inflexibility of contractual terms may prove to be a disadvantage if unforeseen circumstances shift the emphasis or direction of the work. In our case the loss of an employee changed our priorities from DASD to CICS. Fortunately we were able to respond with a contractor already on board since contractual terms were flexible enough to permit it.

One risk more common among consultants than contractors is that of a consultant being less than candid with a client. In order to ensure future business, to please an acquaintance or to disguise inability a consultant may report only what a client wants to hear. This was not our experience but we do know of instances in which this has happened.

A final risk possible with either contractors or consultants is the subtle lowering of morale. Several steps were carefully taken to avoid this possibility and actually resulted in a slight raising of morale. First was to fully present to the staff the extent and impact of the vacancies. Second was to demonstrate what other alternatives were available and why they were inadequate. Third was to describe the various benefits which short-term technically qualified personnel could provide them. Most importantly individuals had to be selected which were at once both highly qualified and personably palatable.

V.   RECOMMENDATIONS

Foremost of any recommendations concerning contract systems programmers or consultants is to have a clear understanding of your requirements. This especially includes identification of deliverables and timeframes. This enables a better evaluation of alternatives and a more straightforward decision in choosing either a contractor or a consultant.

Once the decision to hire a contractor or a consultant has been made steps should be taken as described above to minimize any negative impact on existing staff. Selecting personnel who are both qualified and personable cannot be overemphasized. One

way to broaden the pool of available talent from which to select is to consider global markets. Telephonic interviews may be effectively conducted in these instances particularly when prearranged outlines are used among several interviewers.

A panel of at least two or three individuals should be assembled to interview the prospective candidates. This not only ensures a more thorough review of a candidate's qualifications but may also encourage greater staff cooperation by involving more of them in the decision making process. A candidate's personality should be factored into the evaluation as much as possible to minimize negative impact on the staff.

Some hidden costs which later may become significant are not always apparent in an initial proposal. These could include travel expenses, per diems, parking fees, office space and administrative expenses. Items such as these should be clarified during evaluation of the proposal. Other items which should also be clarified involve any guarantees about the quality, quantity or time-frame of completed work, and policies concerning which individuals will participate and replacement criteria. The latter is especially relevant when considering consultants.

One final recommendation when working with consultants is to express to them your nontechnical and management concerns. Experienced consultants often can offer many candid observations on a variety of topics about your shop. Let them know what is significant and more often than not they will respond.

This basically summarizes the experiences of the Data Service Bureau in utilizing contract system programmers and consultants. Overall our experiences were very worthwhile, resulting in much short-term work being completed in a quality and timely fashion.

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Experiences With Systems Programmer
Contractors and Consultants

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Technical Support Management Project

Session M802

ABSTRACT

The experiences and recommendations derived from the use of a contract systems programming firm to address specific technical support tasks.

Foil 9

The specific software installation task was assigned to the contracting firm on or about September 1st. A list of fourteen software products was formulated. These software products were to be installed or re-installed to the current release level. A co-requisite objective of attaining PUT maintenance level 8106 was also identified.

MVS/SP 1.3 was to be installed. CICS/VS was to be brought up from 1.4 to 1.5 and IMS/VS/DB raised a released level notch as was the DB/DC Data Dictionary. GIS/VS was to be installed to support user-written queries developed on the DOS/VS system. Nine additional products, each requiring small-to-moderate efforts to implement, collectively represented a substantial amount of work to be done.

The target completion date was set for October 1st, allowing a single month to accomplish the task.

Foil 10

The result of a month of intense effort by the contracting firm was, on the whole, quite good. Using five people throughout the month, they had essentially accomplished all goals. One major software product, CICS, was installed principally by a member of the in-house staff with consulting assistance from a member of the contracting team.

The people brought in were, clearly, talented individuals. They quickly earned the respect and support of the staff members. There was no discernible disruption to the continuing activities of MVS conversion. Most of the work was accomplished in the evening hours.

In the months that followed this effort, two disadvantages to the approach had begun to surface. First, the outside installation team had left few tracks, that is, sufficient documentation. Staff systems programmers, new to the OS world, did not have a handle on the procedures used to install and tailor the software. This became burdensome in later problem determination efforts. Second, the in-house staff, standing aside during the whirl-wind activities of the contracting team, gained little knowledge from the effort. In fairness to the contracting firm, though, the single month timeframe toward task completion precluded reasonable documentation and did not afford reasonable documentation and did not afford opportunities for involvement of in-house staff systems programmers.

Foil 11

For two months prior, and a few months after, the software installation event of September, we had utilized the services of the same contracting firm in a different manner. Individual staff systems programmers worked along side individual contract systems programmers to tackle identified tasks. This approach is what I termed the "one-on-one" consulting style.

One pleasing experience with this approach was with the definition of our VTAM network. Our staff member responsible for communications gained accelerated experience in naming standards, NCP generation and VTAM definition procedures. Another staff member worked with a contract systems programmer having tuning skills and acquired significant performance analysis capability.

Foil 12

The final analysis points to a favorable experience with contracted systems programming professionals. I began by qualifying our experience as being somewhat unique because of the MVS conversion and the small and inexperienced technical support staff. Yet, this probably points to best motivation to contract outside systems programmers....to address a specific technical problem that is not expected to require continuing attention.

My recommendations are, first, be sure there is an appropriate amount of involvement and interaction between the contract and staff systems programmers. Second, as with any activity worth managing, start with clearly defined objectives. Finally, continue to foster in-house technical expertise in those areas that are most crucial to the continuing success of the business that you serve.

Foil 1

I shall be relating the experiences of my organization with
a systems programming contracting firm from a, perhaps, somewhat
narrow perspective. First, the Bendix H.V.S.G. data center is
somewhat small from a headcount measure. Second, the use of
contract systems programmers was undertaken to address a specific
problem during a specific and, hopefully, non-recurring
event....that is, a major operating system conversion. The
experience was, on-the-whole, positive. Beyond the satisfaction
of express contract expectations, the most critical issue is the
impact of contracted systems programming activities upon the
in-house technical support staff. I hope our experience
illuminates this issue.

Foil 2

The setting goes back to Fall, 1981. Our data center was in
the midst of a conversion from the DOS/VS operating system to MVS.
The technical support staff was small (3 people) and harbored
virtually no working OS experience. The Operations group also had
no OS experience. The Applications Systems and Programming group,
however, had a couple of people with exposure to OS in their
backgrounds. The MVS 3.8 System that was installed in January,
1980 had had no PUT maintenance applied. It was beginning to
appear that an unstable technical environment would hamstring the
cutover to MVS.

Foil 3

The Bendix Heavy Vehicle Systems Group, now one of the Allied
companies, manufactures air brake systems, fan clutches, cruise
control, and an emerging line of truck electronic products to OEM
producers of Class 6 through 8 truck tractors over-the-highway
trailers, and off-highway construction vehicles. In addition,
aftermarket products are sold to a network of over 350 distributors.

Foil 4

The MIS organization, back in 1981, was comprised of about 20
programmer/analysts in th Applications Systems and Programming
group, some 15 people in Operations, and a staff of 3 systems
programmers in the Technical Support Group. Throughout the
DOS-MVS conversion, 3 contract applications programmers were
supervised by a technical support staff member in their effort to
convert DOS COBOL programs and JCL to MVS. Our experience with
these contract programmers is not included in this discussion.

Foil 5

The hardware environment was composed of 370/158AP and 3031
processors. The 3031 was the principle production DOS machine
while the 158 was employed for MVS conversion testing and a
slowly growing amount of converted production work. There were
about 40 spindles of 3350-type dasd available to either processor,
six tape drives, and other expected I/O devices. The data
communications network supported eight remote plant locations,
each having a 377X batch RJE terminal and a portion of 170 total
remote 327X interactive terminals. The local facility, called
Group Headquarters, employed about 180 327X interactive terminals.

Foil 6

The DOS/VS system was at release 34 and utilized the Advanced
Function feature. Principle software included CICS/VS, DL/1
(functionally same as IMS/DB), POWER/VS, COBOL, and SPMOL for
interactive program development and editing. Maintenance to this
system was essentially frozen and restricted to corrective fixes
and required.

The MVS system was a 3.8 non-SE, non-SP release. Major
software products included CICS/VS, IMS/DB, JES2, COBOL, SPF, and
ACF/VTAM/NCP. In the Fall of 1981, the maintenance level was an
early 80 PUT accomplished only by a re-installation of a new IPO
release several months after the first MVS installation. The shop
had never had the opportunity to learn the PUT tape process.

Foil 7

The applications' philosophical approach was characterized by
a high degree of centralization with a substantial commitment to
IMS databases shared concurrently by batch and CICS interactive
programs. Major application systems included Materials
Management, Manufacturing Control, Accounting/Finance systems, and
Marketing Analysis.

Foil 8

We had employed a contracting firm to augment the in-house
systems programming staff in both of two different approaches or
"contracting styles". First, a specific software installation
task was identified for the contracting firm to accomplish.
Second, over the course of several months, the contracting firm
furnished systems programmers to work with the in-house staff on a
"one-on-one" basis to work on a variety of technical support
tasks.