Managing Outsourcing Contracts for Systems Administration

Frédéric Hemmer, Les Robertson
CERN, European Organisation for Particle Physics
Geneva, Switzerland

Abstract

In recent years, Physics Data Processing changed paradigm from the mainframe to distributed computing. While this move has permitted much more computational and storage capacity to be made available to end users, it also increased the management costs associated with the infrastructure, networking and system administration. During this period CERN the manpower levels at CERN have steadily decreased, while the number of customers, computers, disks and other items has increased dramatically. One of the potential solutions to these conflicting factors (increase in services vs. decrease in manpower) is the use of outsourced services for systems administration. We started to use such a contract at the beginning of 1996, and this is now gradually expanding to include most of the central physics data processing services at CERN with 24 hours per day coverage. We will share our experience in setting up and managing such a contract, underlining successes and difficulties, from human, organisational and contractual perspectives. We will also show how we try to measure the efficiency of such contracts with a view to taking corrective actions in case of problems, and define quantitative standards for use in competitive tenders.

Introduction

The Physics Data Processing Group of the IT division at CERN started at the beginning of 1990 to move from mainframe computing to distributed data processing using UNIX based platforms (see [BAU91] for more details). This strategy has allowed clear benefits for end users: cheaper computing cycles; very large data storage capacity; services geared to the needs and priorities of individual experiments; etc. Figure 1 illustrates the enormous growth in installed capacity which has been possible during the life of the LEP experiments. This move towards distributed processing has of course been accompanied by a massive increase in the number of independent computer nodes (from less than 20 in 1990 to over 300 at the time of the writing), disks and other items requiring management, while the staffing policy of the laboratory has led to a constant decline in the available manpower. Figure 2 illustrates this by showing the total CERN manpower involved in physics data processing activities during the period (including user support, management, general administration, planning, etc.), together with the manpower available for basic systems administration. While the overall staff level has fallen by 25%, the effort available for the systems administration function has been reduced by 40%. It became clear that we could not continue like this, and therefore we started to look at outsourcing some activities. A subsidiary benefit of this was also to understand clearly the costs associated with running distributed services in order to be able to assess accurately the relative costs of different computing farm architectures.

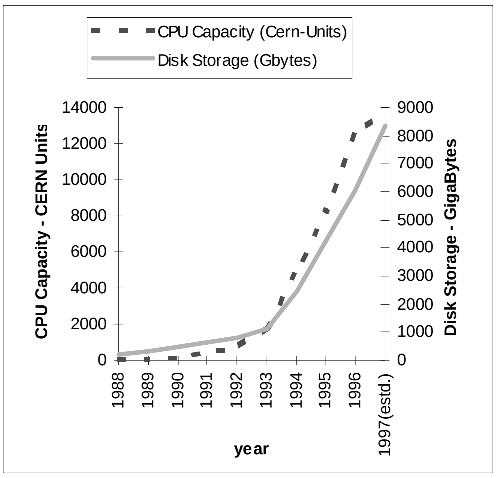

Figure 1: Evolution of CPU and Disk Capacity

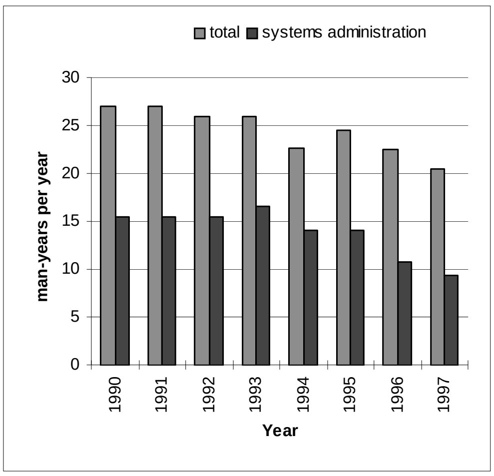

Figure 2: Evolution of CERN Manpower

Approach to Outsourcing

Our initial attempt to solve the manpower problem was by using temporary labour, fairly commonly used at CERN to move the cost of labour from the personnel to the materials budget. This was not successful for several reasons including the difficulty of finding experienced candidates able to integrate easily and rapidly with the permanent staff. Since at this time the CERN policy began to evolve away from temporary labour contracts in favour of service contracts we decided to examine "outsourcing" as a longer term solution to the problem.

The term *outsourcing* seems to be used to cover a very wide range of mechanisms for contracting the provision of (usually labour intensive) services previously implemented by the organisation itself to a third party. In the informatics domain this can include contracting out the complete informatics service, even transferring to the contractor ownership of the existing equipment, infrastructure and staff. At the other extreme the term is also sometimes used, misleadingly, to refer to straightforward temporary labour contracts. Between these two extremes there is a continuum of possibilities, from wide-ranging and long-term strategic partnerships between the organisation and the contractor, to well-defined limited duration contracts which leave strategy and control firmly in the hands of the organisation.

We had just completed the transition from the mainframe to the distributed RISC environment, and were therefore very much aware of the massive financial gains which we had achieved through having local technical expertise and full managerial control of the computing environment, enabling us to evolve very rapidly to new technology as soon as it became practical. This would have been very difficult if the mainframe operation had been largely contracted out to companies whose best interests would have lain clearly with a continuation of the high cost environment. As we were already beginning to see that a further technology change would be necessary to migrate from commodity RISC to the consumer oriented PC products we decided to steer well clear of broadly defined long term contracts.

Other factors for consideration were the continuous evolution of the configuration in response to requirements which are hard to predict more than a year ahead, and the fear that giving control of the services away too quickly would leave us open to the risk of instability and lower quality of service.

We therefore decided to adopt a conservative approach to outsourcing, in the form of very clearly defined short term contracts covering only one aspect of the service: systems administration. This left CERN with full control over user support, hardware purchase and maintenance, configuration and capacity planning, and the technology and architecture of the service. Each contract would have a detailed service level agreement including defined quality measures. At least two contracts would be used to provide coverage for the full configuration, to allow regular re-tendering in order to use competition to ensure the correct balance between price and quality. The contracts would be offset in time to ensure that any problems with a new contract would have a limited effect.

There is a very good summary of recent informatics outsourcing experience in [LAC96], which warns against wide ranging strategic relationships, preferring rather "right sourcing" through contracts of limited duration tailored to the provision of specific services. We are trying to follow this advice.

Fourteen Months of Outsourcing Experience

Having decided to go ahead with outsourcing clearly defined activities, we were faced with the difficulty of expressing specifications of the systems administration activities which could be used in a contract. We discussed this with a service company with experience of outsourcing at other sites and which was already operating at CERN, and finally decided to give them the task of writing the initial specifications for a pilot service-oriented contract. This was a long iterative process, a first sign of the difference between the goals of the contractor and the customer: we formed the opinion that the vendor was more interested in getting a contract signed rather than writing balanced and detailed specifications which would protect us against risk factors. We eventually signed a pilot contract for a limited duration starting in January 1996 and covering a part of the equipment (28 HP and 27 DEC machines in SHIFT). The agreement included the requirement to generate a series of detailed documents:

- a Service Definition Document (SDD) describing the scope of the service, the communication mechanisms and the escalation procedures (see [SDD96]);
- a Service Level Agreement (SLA) describing the responsibilities of each party, the tasks to be performed and the performance metrics to be used (see [SLA96]);

- specific System Administration Procedures and associated documentation (see [HPUX96] and [DUX96]) for each architecture covered by the contract.

The contract covered basic system administration tasks including installation, configuration changes, reactive and proactive problem management, as well as the generation of management tools and the development of service quality and performance measurements.

The agreement specified an aggressive timetable to arrive at these objectives: the systems administration documents were to be completed within two months, and the service was to be taken over completely by the company one month later. A first contract review organised in May was very positive, showing that most of the objectives had been met, that no degradation in the service quality could be observed, and that the documentation produced was of very good quality. The review however suggested a number of areas for improvement.

Scheduling, planning, maintenance of inventories and the communication between the service management and the systems administrator need to be handled much more formally when dealing with a contractor than when dealing with our own staff. It was suggested to use a formal call management system (MasterSoft's OSM, see [OSM96]) for which the company already had experience at other sites. This would help us to formalise the communication paths, integrate the inventory and the service level agreement, and also would allow us to measure the quality of the service by analysing the collected data (MTBF's, time to intervene, time to resolve, faults, etc.). We therefore included in the SLA a definition of initial performance measurements to be reported such as reliability, availability[1], response and resolution times, documentation accuracy, planning and installation milestones as well as customer satisfaction surveys.

A second problem highlighted at the review was the observation that nearly all CERN systems managers showed reluctance (consciously or not) to give away "their" systems. The company itself showed sensitivity to those individuals affected by change, but the result is that even at the time of writing the present paper, the service company has not gained full control of the concerned systems. Sometimes this is due to an apparent lack of confidence in the company on the part of individuals, sometimes because it is in practice usually faster to fix a problem directly rather than go through the formal procedure to ask the contractor to fix it. This aspect is not completely solved yet.

We decided at the same time, to go ahead with a progressive expansion of the contract, in order to provide a 24 hours/day coverage at an agreed cost, and at a later stage, given the positive experience, to expand the scope of the contract in order to include all DEC, HP and SGI equipment.

Potential Problem Areas

Although in most ways the service continued to run smoothly, with good reliability levels, by the end of 1996 we were aware of three problem areas.

The first one is the implementation of the call management system, which was installed by MasterSoft at the end of the summer, but not really used as specified until the beginning of February 1997. The reasons included our failure to provide a suitable PC for our Operations Manager, making it very difficult for him to initiate calls, but the main reason was a lack of momentum in the contract follow-up. This resulted not only from increased responsibilities of the company's team leader for other contracts, but also from staffing problems on the CERN side caused by unanticipated departures and the yearly computer allocation discussions which left very little time for anything else. The end result is that we are some way from having a set of service level performance and quality measures - essential before we re-tender part of the service.

A second problem was coverage during CERN's two week end of year shutdown. Our contract mistakenly specified coverage for all periods except the Christmas shutdown. However, this period when the computer services are not in operation, is a time of intense activity (software and hardware maintenance, upgrades, reconfigurations, etc.) that cannot take place at other times during the year. Due to our failure to foresee this in the contract all of this work was carried out by CERN staff instead of the contractor's staff, resulting in a return of control of the systems to CERN staff, undoing some of the progress which we had made towards full hand over of the services.

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[1] As an example availability is defined as service available time/(total time - scheduled interruption time - interruption time for incidents not attributable to the contractor).

Finally, due to the stability of the contractor's staff we have not been able so far to test whether the procedures and documentation are good enough to ensure the continuity of the service quality when the company's normal staff are unavailable. The quality of the documentation and procedures will be very important if another company is eventually selected by a competitive tender.

Conclusions

Our experience has been so far globally positive :

- Formal procedures have been developed and very well documented, allowing in principle anybody with the appropriate skills to perform the system management tasks. System management tasks are performed with very few problems or mistakes, and the delays introduced by using formal procedures are not penalising too much our operations (although we do not yet have formal metrics).
- There is now a clear cost attributable to systems management, which can and is reported to the management. This cost seems to be lower than when using CERN staff.
- Scaling up the size of the configuration is no longer restricted by CERN staffing level, only by the budget available.

There are however a some areas which need improvement :

- More involvement from CERN is needed in the contract follow-up, in particular in the area of the day to day operations follow-up and reporting, objectives monitoring and pro-active Service Level Agreement evolution. The cost of "contract management" is far from negligible and must be taken into account when outsourcing a service.
- The performance metrics need to be gathered and analysed carefully not only to assess the value of the contract, but also to prepare ourselves to use these metrics when going to competitive tenders. The risk factors needs to be understood more in detail in order to clarify which type of contract(s) is the more appropriate for our outsourced activities.

We hope to have completed the assessment of performance metrics before the summer and be ready to prepare a tender by the end of the year.

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