

The Good, the bad and the ugly – A case study in selecting a maintenance work management system

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BACKGROUND

The primary support tool of an effective facilities management department is a facilities management system. Used properly, it supports day-to-day operations through management of work orders and captures data that allows the production of a wide range of management reports, including maintenance forecasts.

The Facilities and Services Division of The Australian National University first implemented a facilities management system (FMS) in 1986. This application was developed *in house*, and ran on an Oracle database platform. While relatively advanced in functionality, as the years passed it was surpassed by commercially developed systems. Additionally, as is the case with all applications developed in house, support for the FMS was limited, with only handful of people having sufficient knowledge of the design to be able to rectify problems or make modifications.

FMS was used to capture maintenance, capital works and asset data. This system had functionality, which included the capacity to produce work orders, for corrective maintenance. It also retained data that allowed the Division to produce a preventive maintenance schedule, though through most of its life, the focus of the maintenance operation was breakdown, rather than preventive maintenance and as a consequence, there was limited use of this functionality. One limitation was that it could not be directly interfaced with the University's financial systems, which were also developed *in-house* and ran on a mainframe. As a consequence a second system needed to be developed (called job cost system) to capture and pass financial data on maintenance and capital works projects. This meant that staff were required to double key data into both the FMS and Job Cost systems, resulting in a high potential for transcription errors, in addition to generating additional work.

Access to the system was restricted to administrative staff working in help desk roles and maintenance managers in planning roles. Operational maintenance and project staff did not have direct access to the application either to review existing work orders, generate new ones or run management reports. This was the product of an accepted business practice, that assumed operational staff did not have any need to access system information, rather than any inherent limitation in FMS. Put simply, though the application

was not user friendly by modern software standards (it was text rather than windows based), had there been a desire on the part of Divisional management, it would have been possible to train a broader group of staff to use the system.

This exclusion of staff created its own problems as Divisional work practices became more dependent on the information produced by FMS. Operational staff did not have the skills needed to use systems, and more importantly in some cases had developed a belief that they were not *capable* of using the system. It also made the maintenance operations dependent on central administration, for without them, *the mysteries of FMS could not be unlocked*.

By the late 1990s, discussions had begun within the Division regarding the possible replacement of the FMS. This issue was brought to a head by the fact that the University made a decision to replace its existing mainframe systems, which were not *Year 2000 compliant*, with an enterprise wide business solution. The replacement chosen was a business system developed by Peoplesoft, which would provide financial and purchasing, human resources and student administration functions. These applications would run on a SQL Server database platform.

Driven by this decision (and the fact that the Job Cost system was also not Y2K compliant), the Division established a project team to evaluate options for replacing or upgrading FMS. This team included members of the IT and Maintenance sections, and initially, a member of the Divisional Finance section. However, primarily due to staffing problems within that area, following the departure of the Finance manager and the subsequent difficulties in finding a suitable replacement, a finance representative was only available during the requirements definition phase. (As we will note later, this issue had a significant impact on the post implementation acceptance of the new system in the finance area.)

The project formally commenced in late 1997, with the aim of assessing a range of proprietary facilities management systems, as well as our in house system, against criteria established from user requirements. A Project Steering Committee, chaired by the Director, Facilities and Services and including representatives of both the Division's project team and the University's financials project team, was established to oversee the project.

SYSTEM REQUIREMENT DEFINITION & ACQUISITION

The first phase of the selection process, *System Requirement Definition*, commenced in March 1998 with a clear definition of the project scope, phasing and management infrastructure. Functional needs were then assessed and documented in four major categories.

- Application Functional Requirements
- System Infrastructure Functional Requirements
- Interface with other systems
- General Requirements

Details of **applications functional requirements** and the high level data required to support critical business needs were derived through analysis of information gathered via a needs assessment survey together with interviews with a wide range of staff from all levels and across all sections of the Division. Whilst the major focus of the project was on facilities and financial management activities, related activities in the areas of space and project management were also given some consideration.

This information also fed into definition of **system infrastructure functional requirements** in the areas of user interface and enquiry, reporting and analysis tools. Requirements for technical system administration facilities and security functions were also included in this section.

The capacity to **interface with other systems** to avoid duplication of functions and data, to provide an integrated view to users and the flexibility to adapt to possible future changes in target systems and platform was also specified as it was known that the major interface system, the University's finance system, was also being replaced for Y2K.

General requirements in a number of areas were also considered essential to the overall success of the project. These included the vendor and/or developer's history in terms of the product proposed, the organisation's long term viability and capacity to provide on-going and adequate local support, the availability and quality of training and help facilities and the adequacy of both user and system documentation.

Whilst the System Requirement Definition document was being finalised and reviewed by senior managers across the Division, the Project Steering Committee accepted the project team's recommendation that Expressions of Interest be sought as a means of identifying potential suppliers and selecting a restricted panel to proceed to the Request For Tender stage. EOI advertisements were placed in major newspapers in early June 1998 and survey documentation was made available on the web. Nineteen formal responses were received by the due date of 29 June.

A formal evaluation methodology was developed to enable an overall assessment of survey submissions. This consisted of six stages (compliance with EOI process and instructions, commercial standing, costs, ability to satisfy system infrastructure functional requirements, ability to satisfy applications functional requirements, vendor & product performance at presentation, demonstration and/or site visit) each with a number of criteria which were rated according to **criticality** of the criterion, the extent to which the criterion is **satisfied** by the proposal and the **acceptability** of the proposed solution.

Four prospective vendors were shortlisted after completion of stage five and requested to supply further details in light of the University's decision to adopt PeopleSoft as the Enterprise Solution Provider on an SQL platform. These four shortlisted companies were:

- PSDI Pty Ltd offering Maximo
- Eden Technology offering FMMS
- Data Stream Pacific offering MP2 Enterprise
- Plus Facilities Management and PM2 Systems offering a combination of facilities

management, asset management and space management systems (ie. Archibus, Artemis and Grange)

The Steering Committee determined at this stage that an extended evaluation, involving more detailed responses to the full SRD, demonstrations and site visits, would obviate the need to proceed to tender and that only two of the remaining proposals should be considered further. These were the PSDI and Eden Technology.

As a result of these deliberations a contract was signed for the purchase of MAXIMO on 29 September 1998. MAXIMO was judged to provide the best strategic fit for the range of needs identified.

DEVELOPMENT & IMPLEMENTATION PHASE

Once Maximo had been selected as the application to replace the existing FMS, the project moved into the system development phase. Initially, it was believed that the project delivery date would be December 2000, thereby giving the project team approximately 10 months to develop the application and the interface to the Peoplesoft financial system, transfer any required data from the old to the new system and complete the training of staff . However, the Maximo project was driven by the time line set by the Peoplesoft or, as it became known, the Enterprise Solution Project (ESP). Early in 2000, the Finance Committee (a sub group of University Council) instructed the ESP team that it would have to rollout the financial application of the ESP by no later than 30 August, to ensure that it had been running for at least four months, prior to the end of year date changeover. Given that the old mainframe systems would cease to function after this date, thereby depriving the Division of the capacity to collect budget data on its maintenance work and project , it became necessary to adjust the Maximo project time line to coincide with the ESP rollout .

The development phase commenced with a planning workshop in October 1998, encompassing discussions regarding the scope of work to be undertaken and project team membership, roles and responsibilities. This fed into the development of the project plan and budget projections, with the focus of the first phase, to be implemented alongside the new PeopleSoft Financials system on 30 August 1999, being replacement of existing corrective maintenance management and job costing functionality.

Two major decisions were also made at this stage. Firstly, because a standard interface to PeopleSoft on SQL server was still on the drawing board and unlikely to be available before implementation deadline, it was determined that an interim interface would need to be built. Secondly, MAXIMO functionality was to be considered generic best practice and it was decided that customisation would only occur if a significant functional gap was found and would result in business needs not being satisfied. MAXIMO system functions would, however, be used to adapt screen appearance and tailor system set up. This decision had the added advantage of minimising set-up costs and maintaining an upgrade path.

Concurrent with the development of Maximo and the interface, the project team also worked with the Divisional Management Group to redesign business practices. These new procedures were intended to overcome many data capture problems of the old system and eliminate any need for double keying. They would also devolve some responsibility for data capture and work order management down to the maintenance staff (that is, maintenance

staff would become the primary users of the system: entering work orders, labour information and raising purchase requisitions directly, rather than relying on administration staff, as had been the case with FMS). These new business processes drove the design of Maximo, in particular, the type of cost and failure data that would be captured.

The full project team was not operational until February 1999, due to existing work commitments and a delay in system setup and scheduling of basic training. As indicated earlier, this included members of both the IT Support and Maintenance sections. However, it did not include any members of the Finance Section, as resource shortages in that area made it impractical to release a staff member. Given that the senior manager for the area was a member of the Steering Committee, it was agreed that he could provide advice on relevant issues at that level.

Several discreet tasks were undertaken during the development phase:

- The **technical infrastructure set up** included software installation and establishment of development, test, acceptance and production environments. This was undertaken by the central Management Information Support Section which retains an ongoing role in this area.

- As mentioned above, the **business process review**, undertaken by the project team, aimed to assess business needs and determine how to best make use of MAXIMO functions and facilities rather than just perpetuating existing practices. Consideration was also given to management and operational reporting requirements and this was used as the basis for defining the failure reporting hierarchy.

- Development of the **data collection and conversion strategy** involved the team in examining many different repositories of data and determining if, how and when the data should be collected into the system. This covered both reference type data, such as locations and equipment, and operational data such as outstanding items of work or un-acquitted purchase requisitions.

Other areas of activity included documentation of risk assessment and management strategy, establishment of security policy and development of testing and training plans.

- These activities led into the **system setup**, during which screen appearance and underlying system data fields were tailored. Early in this stage a prototype system was set up and demonstrated to prospective users from the various stakeholder groups and their comments taken into consideration for final setup. Training and acceptance testing were undertaken on the fully established system.

- Specification of the **interim interface to financials systems**, encompassing links to PeopleSoft purchasing, legacy Ledger and Purchase Card systems, continued in parallel with other tasks and was undertaken in close collaboration with the PeopleSoft Financials implementation team. A guiding principle, given the expected interim nature of the interface, was that it should be simple, robust and not over-engineered. Development of the MAXIMO side of the interface was undertaken by external consultants who had had previous experience with MAXIMO, whilst the PeopleSoft side was managed by the Financials team.

When the preliminary design had been completed, several users were seconded for a short period of time to complete acceptance testing and where appropriate, any modifications requested were included in the final system design.

TRAINING

A critical phase in the project came next: user training. During the design stage, a member of the project team had been tasked with developing a training program which would develop the skill sets of operational staff, allowing them to become the primary users of the system.

As indicated earlier, there were only a handful of staff who had access to legacy system (FMS). With Maximo, access and operational use was to be expanded to a much larger group within the Division and, in particular, a group with very limited experience in using IT management systems. With that in mind, the first aim of the training program was to familiarise staff with the new system. In simple terms, this meant an initial session in which users :

- Saw what Maximo looked like.
- Were given a demonstration of functionality .
- Were given an opportunity to ask questions and air concerns

Once the initial familiarization was completed, the more formal training program was implemented. Training was divided into modules, each based on specific functionality in the Maximo system. Attendance at modules was based on the level of skills required by users to complete their work. This approach, while more time consuming from a training perspective (ie. it meant more training programs needed to be developed and more time allocated to the delivery training), allowed for a more targeted delivery of training, with better overall results in terms of knowledge retention.

Consistent with the aims of targeted training was the need to develop a training manual that was simple to understand, regardless of the level of computer literacy of user. The manual provided by the manufacturer (PSDI, now MRO.COM) was typical of system manuals, in that it assumed that all users had high level skills. The terminology assumed prior knowledge that many of our operational staff did not have and it was also largely text based, with few graphics and consequently hard to follow. The manual produced by the Division used graphics of the screen on one page with step-by-step instructions written on the following page. On the text page where a particular key or button was required to be activated a graphic of it was placed directly under the instruction, hence allowing users to associate the icon with the instruction.

With in excess of 50 key players to be trained, a program was set up to be run over the two weeks period prior to roll out date of 30 August 2001. This timing was considered essential, as the greater the gap between the training program and the time when staff could apply the knowledge gained in the course, in an operational environment, meant a higher likelihood that the skills would be lost.

A training environment was established on the Maximo server and this was used for the training course. Another environment was established, called play pen, which allowed users to experiment on the application, as part of a process of becoming more confident about their skills. Staff were given access to “play pen” both before and after their training.

The training programs themselves grouped staff with similar Access/Business requirements (eg maintenance staff, project staff etc.) and IT literacy levels. The latter was an important consideration, as staff in groups with similar skill levels were less intimidated and became more involved in the training program. It was also agreed that the programs would have a set number of participants. In our case the optimal number was considered to be six.

Once the initial training had been completed and the system rolled out for use, a program of one on one training was established, with various project team members being nominated as the mentor for staff in specific areas.

Overall the training program can be summarized, by saying that most staff quickly understood the system and were keen to use it in the operational environment. Some were confused and this has been largely overcome by follow up training in groups and one on one situation. Finally, some were frustrated by their inability to pick up the skills quickly and to a large degree this was resolved by having the user slow down and pay attention to actually what they were actually doing in the system.

THE GOOD, THE BAD AND THE UGLY

Maximo was delivered on schedule, with the application in operation on 30 August 2000. In the two years since the rollout, the system has functioned without any major problems and there is general consensus that it has improved the overall efficiency of the Division’s operations. However, that is not to say there have not been problems. In particular, several key staff in the finance and administration areas resisted the changes in work practices that accompanied the implementation of the new system. As a result, some business procedures have been applied in an ad hoc manner and consequently there have been some discrepancies between financial data recorded in Maximo and Peoplesoft, particularly in the minor works and capital projects areas.

A review of the project, two years in, reveals a number of things that were done well and some that, given the time over, would have been done differently. These can be summarised as: the good, the bad and the ugly

The Good

The Maximo system is an excellent tool for supporting facilities operations. Once minimal training has been provided, anyone can use the application and the more they use it, the more proficient they become.

The system has been integrated into the work practices of zone maintenance staff, with a consequent improvement in service efficiency. Our maintenance crews can now create their own work orders or access information on line. This gives them a greater sense of

ownership of the work and this ownership is reflected in the way they deal with clients.

Overall, the introduction of Maximo has improved our ability to process and collect data and deliver management reports.

The Bad

This was the first major systems rollout undertaken by the Division and as a consequence, we did not appreciate just how resource intensive the project would be.

The team had members from the IT Support and Maintenance areas, but not from the Divisional Finance area. The latter was the product of staff changes within that area following the departure of the Finance Manager. The lack of finance expertise had an impact on the design of the business practices, and as noted in the following section, proved to be a poor decision. In reality, the team should have had at least 4 full time members (instead of 2.5 members), with one being conversant with University and Divisional finance systems.

As indicated earlier, the time line for the project was linked to that of the ESPF project. This meant that we had approximately eight months to develop and implement the Maximo system. While it was delivered on time and on budget, this was the product of long hours and dedication by the team. The reality is that, if we were to do it over, we would need more resources and time.

The Ugly

The ugly comes down to one thing: the reaction of some staff to the business process changes that accompanied the introduction of the new system. While some resistance was expected, in some areas it exceeded those expectations. This was largely the product of not involving finance and administrative staff more closely in the project. As a consequence, it has taken almost two years to overcome the resistance and there have been a number of personal conflicts along the way. Given the time over, a much greater emphasis would be placed on the management of change.

CONCLUSION

The introduction of Maximo has achieved most of the objectives established by Divisional management at the beginning of the project. It is far more user friendly than the legacy system, hence allowing a broader range of staff to use it to capture data at source. The system allows clients to access information relevant to their work requests and produces a much higher level of management reporting. However, given the time over, there should have been more resources and time allocated to the project and greater emphasis placed on the management of change.